Report of the
KAMPUCHEA NEEDS ASSESSMENT STUDY

AUGUST 1989

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KAMPUCHEA NEEDS ASSESSMENT STUDY

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AUGUST 1989

Note: The United Nations Development Programme does not accept responsibility for the accuracy or completeness of this report or the views expressed in it.

Preface

This report has been written by a multi-disciplinary team appointed, in accordance with his mandate, by the Administrator of the United Nations Development Programme to undertake a Needs Assessment Study for Kampuchea. In the period prior to 1975, the UNDP and the Specialised Agencies were playing an important role in Kampuchea's social and economic development, particularly in such key sectors as health, education, agriculture and water development. It is in this light that the report has been prepared.

The Mission was appointed under the following Terms of Reference:

(1) Review the social and economic situation of the country including an analysis of the major strengths of the economy as well as constraints to development;

(2) Assess, to the extent possible, the levels and impact of current programmes of external assistance;

(3) Identify priority needs for external assistance and estimate the extent of resource requirements;

(4) Recommend any feasibility studies, sector reviews, or other preparatory tasks which need to be undertaken in the near future to ensure the effectiveness of future aid flows; and

(5) Recommend a strategy for the co-ordination of aid in post-settlement Kampuchea.

The report is organised in eight parts, preceded by an executive summary. Following an outline of historic, economic, and demographic characteristics of the country (Part I), the bulk of the report comprises the sectoral studies that have been undertaken in the course of the Mission's work (Parts II-V, subdivided into 19 chapters). Based on these, the Mission has summarised international responses to the crises which have affected the country in modern times (Part VI), and drawn up a number of project profiles which describe in outline the scope of certain sectoral needs (Part VII). To facilitate further work, the report is concluded by an annotated bibliography of sources used by the Mission in the course of its research (Part VIII). The executive summary is also available, along with the project profiles, in a separate volume.

The present document does not provide a plan or blueprint for the future development of Kampuchea, since this must clearly await the establishment of a new government in Phnom Penh enjoying international recognition. As the Terms of Reference imply, its purpose is to collect and review relevant information on the subject of Kampuchea, to present views on the current development status of the country, and to draw up project profiles for some of the more important tasks which lie ahead. Suggestions have been made on the ordering of priorities within sectors, but no overall priority rating has been attempted.

Every attempt has been made to render the discussion as politically neutral as possible. Nevertheless, the particular nature of Kampuchea's experience during the past 20 years, especially during the 1970s, has affected the lives of its citizens and functioning of its economy in so many profound ways that detailed explanations are both unavoidable and necessary. These effects therefore have been described in their appropriate context because they have a direct bearing on the way in which the country has developed since, and on the problems which it currently faces.

Similarly, some treatment of policies announced or implemented by the present Phnom Penh authorities has been necessary to explain current conditions and prospects, notwithstanding the possibility of policy adjustments if a political settlement leads to changes in the *philosophy currently guiding economic management. Where discussion of prospects requires policy assumptions, the Mission has generally assumed continuation of the recent progress. It has become clear in our numerous discussions with all concerned, that there is an aspiration to return the country to the social and economic status that it enjoyed in the late 1960s, when the outlook was so promising, and to achieve this with less emphasis on state ownership and control of commercial activities. The Mission therefore makes reference to conditions in the 1960s so as to provide a datum against which to measure the current situation.*

The Mission has not visited Kampuchea. Instead, it has sought information from as many sources as possible outside the country, including recent reports prepared under the auspices of UNICEF (whose reports have been especially useful), the World Food Programme, and UNHCR, and discussions have been arranged with persons engaged in operations in Kampuchea from these agencies. The Office of the Secretary General's Special Representative for Humanitarian Assistance to the Kampuchean People has also provided information of assistance to the Mission. We would like to acknowledge all of this assistance with grateful thanks.

The Mission has also derived much benefit from meetings with many representatives of non-governmental organisations engaged in work in Kampuchea as they passed through Bangkok, who have unstintingly provided documentation, including reports prepared under their own auspices, and have assisted in other ways. In some cases, reports emanating from the Phnom Penh authorities have been obtained through the good offices of these NGOs, and have been used by the team with appropriate attribution. The Mission would at once wish to pay tribute to the work of these dedicated people, and express its thanks to the whole NGO Community for the generous way in which they have offered their assistance and advice. While many have assisted in all kinds of way, the efforts of Ms Onesta Carpene of Australian Catholic Relief and Mr Grant Curtis have been especially helpful. In particular, through the good offices of the Swedish International Development Authority, the Mission was able to consult Mr Curtis's Country Profile which is still in draft form, but will later be published. This has been of considerable help to us.

Because of the urgent demands of reconstruction, less attention has been paid by the authorities in Phnom Penh to the compilation of statistical information than would normally be the case. Therefore, the researcher whose task is to compile and assess information about Kampuchea is often handicapped by a lack of reliable statistical data at the national level. Although there are qualifying statements in many places in the text about the reliability of the information presented, this caveat applies to some extent to the entire text. Not until a well-organised system is set up to collect and analyse data will the problems of statistical variance be fully resolved.

Throughout its work, the Mission has observed that work is in progress inside Kampuchea, the results of which are likely to supersede certain of the information and conclusions reached in this report. We understand, for example, that UNICEF is sponsoring work on health and education, the results of which will not be available until later in the year. Nevertheless, every attempt has been made to prepare as definitive a statement as possible on the current situation in all sectors of the present Khmer economy. Furthermore, because the Mission could not verify some information by discussion with the Phnom Penh authorities first-hand, or by observation within the country, the possibility of error cannot be ruled out.

The Mission would wish to dedicate this work to the people of Kampuchea. We have been impressed by the evident patience with which they have endured two decades of hardship, and hope that the report will advance their future well-being by contributing to the greater international efforts needed to assist the country's rehabilitation and development.

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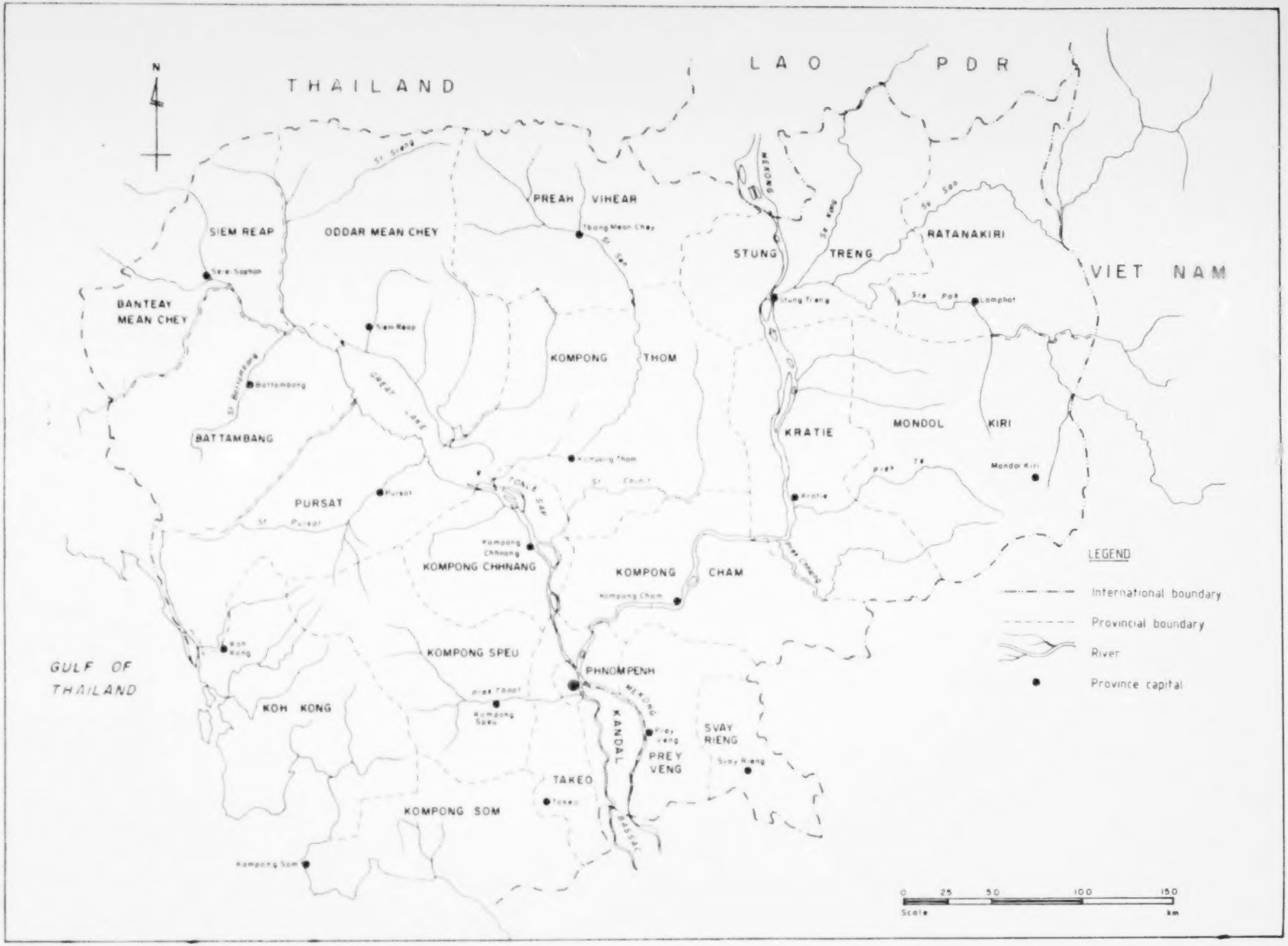

N
THAILAND
LAO PDR
VIET NAM
GULF OF THAILAND
SIEM REAP
ODDAR MEAN CHEY
PREAH VIHEAR
STUNG TRENG
RATANAKIRI
BANTEAY MEAN CHEY
BATTAMBANG
KOMPONG THOM
KRATIE
MONDOL KIRI
PURSAT
KOMPONG CHHNANG
KOMPONG CHAM
KOMPONG SPEU
PHNOMPENH
KOH KONG
KANDAL
PREY VENG
SVAY RIENG
TAKEO
KOMPONG SOM
MEKONG
BASSAC
GREAT LAKE
TONLE SAP
St. Sreng
St. Sen
Se Kong
Se San
Sre Pok
Prek Te
Prek Chhlong
St. Chinit
St. Pursat
St. Battambang
Sisophon
Siem Reap
Tbeng Mean Chey
Stung Treng
Lomphat
Battambang
Kompong Thom
Kratie
Mondol Kiri
Pursat
Kompong Chhnang
Kompong Cham
Koh Kong
Prek Thnot
Kompong Speu
Prey Veng
Svay Rieng
Takeo
Kompong Som
LEGEND
International boundary
Provincial boundary
River
Province capital
0
25
50
100
150
Scale
km

KAMPUCHEA NEEDS ASSESSMENT STUDY

Executive Summary

ISSUES

The problems that will confront a future administration in Kampuchea are likely to be enormous; and in this report, the Mission has sought to review and discuss many of them. However, in essence many of these problems may be posed in the form of a single question: how may a future government of Kampuchea reconstruct its shattered social and economic structure with the depleted human and material resources at its disposal?

As a country, Kampuchea certainly has a potential for economic independence. But its material status has suffered greatly, and in spite of the considerable progress that has been made to revive the economy, the effects of a lack of investment have shown up in all social and economic sectors. Even in agriculture, where a considerable revival has taken place, further improvements in performance can only be expected if investments take place in inputs such as more draft animals, fertiliser, irrigation, and seeds. Moreover, because of the lack of money, the normal routine practices of repair and maintenance of basic infrastructure have not taken place, and the condition of many installations has seriously deteriorated as a result.

If Kampuchea's problems could be resolved by the mere injection of more materials resources, its future, one hopes, would be assured. As it is, however, it suffers from a more profound difficulty in that the human resources required to achieve the necessary turn-around have been seriously depleted, and many of those who survived continue to bear the consequences of long periods of strain. This problem is manifest at all levels.

At the level of the administration itself, it has been estimated that there are at present no more than about three hundred experienced or qualified persons of all disciplines left in the country to govern, teach and practise their professions. Although these numbers may well be augmented when the people from the border camps return, and further so if at least some qualified expatriate Khmers decide to come back, the task of steering the country through the difficult days ahead is likely to devolve upon very few people.

The effects of this depletion can be seen also at the level of the ordinary people. War and famine have robbed the country of many of its young men, leaving it with a great preponderance of women, many of whom have been widowed. Women are therefore playing an unprecedentedly important role in the future life of the nation; but, burdened as they are with child-rearing and their traditional duties in the home, they are finding it difficult to undertake tasks that are traditionally done by men. Since this state of affairs is likely to continue into the foreseeable future, it is of paramount importance that imaginative policies and programmes be devised, both over the short and medium terms, that will address the needs of these women, and so optimise their potential contribution to the future well-being of the country. This is an issue to which we return throughout this report.

Although it is understood that large volumes of technical aid and assistance have been provided by the Soviet Union and its allies, as well as by the NGOs, a paradox is posed of a country which has been comparatively starved of investment, but whose capacity to absorb more of it is likely to be constrained by a lack of qualified people able to plan, manage, and implement the projects that may be on offer. As regards Eastern Bloc aid, the Mission has not been able to obtain a comprehensive statement on it, though it has made numerous references to it in the text. Much more is known about NGO assistance, and the experience gained from the work of NGOs is likely to be of great value for the future. This is because they have been working in the country continuously during the past several years, and have had to gear the size and pace of their operations to the capabilities of their counterparts.

A comprehensive evaluation of the NGO programme and experience is recommended to derive benefit from their knowledge and expertise in the range of activities with which they have been involved, and to establish the extent to which these activities might be replicated and expanded.

The NGOs have in many cases extended their mandate to undertake larger scale projects; but they are the first to admit that the scope of effort that is now required is beyond their own capabilities. There will indeed be a need for a great number of such projects, particularly those of a pre-investment character, or involving investment proper, that are extremely urgent but may go far beyond the scope of those that have so far been undertaken in Kampuchea. They will demand management and technical skills that are in very short supply in the country at the moment. There are no short cuts to the gaining of knowledge and experience in such work; but if the dimensions of the problem are appreciated, measures can be taken to mitigate the consequences of it.

In the first place, it might be desirable to propose that a massive training-cum-observation exercise be mounted. There could be many dimensions to this. At one level, study tours might be organised to enable as many as possible of the high-ranking people in the future administration to visit institutions and installations throughout the world, so as to familiarise themselves with developments that have taken place during the past 15 years of their isolation. At another level, a detailed study might be undertaken to identify gaps in technical knowledge and experience that would have to be filled as a first priority; and to design and implement a comprehensive "crash" education and training programme to make good these deficiencies as soon as possible.

Second, there are the numbers of expatriate Khmer whose services might well become available, once a settlement is reached. Whether it would be possible to induct these people back into government itself is not for the Mission to say; but their technical knowledge constitutes a priceless resource, on which it seems essential to draw. Attention is drawn to the UNDP's TOKTEN programme as one way of drawing upon this experience (see box on page xxiii).

A third way is through technical assistance itself, with much of the technical and management skills being provided by international experts and/or firms of consultants. However, project agreements for such exercises must be very carefully drawn up so as to ensure that transfer of management and technological know-how takes place to the greatest extent possible, and is still consistent with good management practice.

When the time is ripe, many kinds of assistance may well be offered by the community of nations to assist in the reconstruction of Kampuchea. Yet this flood of goodwill could cause difficulties unless it is linked with established priorities and matches the country's ability to absorb the aid. The ultimate decisions on these matters are of course to be vested in the country itself, but to do so effectively, it will be essential to develop a strong central capability within the future administration, probably within the office of a very senior member of government to decide upon, manage, and monitor the implementation of the aid projects. Unless this is done at the very outset, the reconstruction programme may well rapidly become a series of ad hoc projects, unrelated to each other, and perhaps with only limited relevance to Kampuchea's true objectives. It is understood that the Phnom Penh authorities have already set up an office with these kinds of responsibility. The future administration might consider soliciting assistance from the UNDP to help in enhancing the capability of such an office, and a project profile has been drawn up for such a proposal.

In conclusion, the Mission wishes to raise the problem of mine fields. Although we understand that considerable efforts have been undertaken to deal with this problem, the Mission has been informed that mines have been laid in parts of the country, particularly along the border areas; and there may still be unexploded bombs and other ordinance in those parts in the south and east which were subjected to extensive bombing in the early 1970s. If such dangers still exist, they constitute a danger to life and limb. It is therefore strongly suggested that measures be taken to locate and isolate the affected areas, and to conduct campaigns among the people who live in such areas, and within the border camps, to familiarise people with the problem, and instruct them what to do if they come across such mines. Assistance might be solicited from friendly governments to develop ways to tackle this menace.

The Menace of Land Mines

For almost 20 years, mines have been laid in certain areas for military purposes, and indiscriminately in certain parts of the country. Furthermore, areas in the south and east of the country were subjected to heavy aerial bombardment in the early 1970s, and unexploded bombs may still lie hidden in fields and undergrowth. There is therefore a continuing danger that innocent people, some of them returning from the border camps, may suffer as result of venturing onto areas of infestation.

The people who are living in high-risk areas, and those - such as returnees from the camps - who are compelled to go through them, may need help to enable them to identify mines, and instruction in the actions to be taken if they come across them. Moreover, efforts should be made to identify areas where mines and unexploded ordinance of all kinds are located, and measures proposed to deal with them.

Assistance might be solicited from friendly governments to assist in these tasks.

IMMEDIATE PRIORITIES

The Mission has prepared a portfolio of project profiles to indicate those development areas where immediate work seems to be called for. For ease of reference, these are arranged in the same order as the sectoral studies in the main report. The proposals contained in them should be regarded as indicative only; before any kind of commitment could be made, much more work would be necessary to define their scope and content with the precision required. While no priority has been assigned to these projects, it is to be hoped that rapid resolution of the political dimensions of the settlement will enable work to start on the next stage of the work with minimum delay.

The whole question of priorities is not one which the Mission has examined in depth. Nevertheless, in an attempt to address the most immediate problems that are likely to be faced by the future administration, preliminary proposals are advanced below for donor consideration. These proposals are presented in two phases: those which could be undertaken immediately to provide the basis for longer term activities, and those which merit a high priority over the short term.

A Preliminary Aid Strategy

If the immediate full resumption of aid has to await further discussions - or indeed the holding of elections - the Mission suggests that certain preparatory activities could be initiated by the international community in advance of the settlement. The proposed activities are listed below, and are of such a nature that will not require the commitment of large sums of money, yet will prepare the ground for a rapid build-up in the aid effort once an internationally recognised government is installed. In compiling this list, it has been borne in mind that a short-term mission has already been organised through

NGO channels to advise on economic development.

The suggested preliminary aid strategy would comprise the following activities:

- Organisation of large scale training-cum-observation tours for senior professionals both from Phnom Penh and the border camps. As already stated above, the object of such tours would be to enable such persons to visit institutions and installations throughout the world, in order to familiarise themselves with recent developments.

- Soliciting assistance to cope with the problem of mines and unexploded ordinance on the lines suggested above. Unless the dimensions of this problem are properly defined, the possibility of widespread tragedy cannot be ruled out (profile A.1).

- An appraisal of NGO activities in Kampuchea and in the border camps so as to derive benefit from their experience for future larger scale technical assistance programmes.

- Initiation of important sector studies to examine in greater depth the constraints confronting a new government and the ways in which these can be overcome. The sectors which would require most urgent attention are: economy and finance, agriculture, energy, infrastructure, health, and education. (For the latter two sectors, it is understood that UNICEF is in the process of preparing reports.)

- Assistance in setting up the necessary mechanisms to enable the government to negotiate, appraise, coordinate, and monitor foreign aid proposals, both multilateral and bilateral, or enhancing the capability of such mechanisms if they already exist. It would be desirable if such mechanisms were to be in place before aid flows started in earnest, so that optimum use can be made of them (profile A.2).

- Following up relevant present activities by initiating a pilot programme to assist selected groups of women by providing money (perhaps of the order of US$ 2 to 3 million) to enable the purchase of much needed equipment, animals, or other supplies. This might be undertaken under NGO auspices, and should be capable of replication.

- Last, but by no means least, provision of assistance in planning for the longer range development aspects of resettlement of displaced persons on the border. It is understood that preliminary work of a fully acceptable standard is already underway on this; but it should be reinforced so that the ultimate objective is achieved of preparing a comprehensive and multi-sectoral planning framework for this important exercise, centering on Battambang province.

A Short-Term Strategy

In the sectoral summaries that follow, resumes are given of the most important findings of the main report. These sectoral statements provide the basis for the following proposals for development activities which, by virtue of their high priority to the future of Kampuchea, should be undertaken during the short term:

- Bearing in mind the lack of trained people, and to deficiencies in the young adult age group, it seems essential that maximum priority should be accorded to human resource development during the longer run. This implies that emphasis should be given to training and the enhancement of health and education services through the provision of both technical and material assistance. As will be seen in the sectoral summaries below, a basis has been established already in welfare services, and this should be built upon (profiles R.1 and 3, S.1, and T.1).

- In the agriculture sector, the most urgent activities are to rebuild the national archive so that a research capacity can be re-created (profiles B.1 and 3), and to improve the quality and numbers of livestock, thus capitalising on the efforts of the NGOs working in that field (profiles C.1 and 2).

- In the urban sector, the most important action would be to improve power supplies, particularly in Phnom Penh (profiles I.4 and 5); it is suggested in the main report's Chapter IV.B that 10 small-scale generators should be supplied for smaller towns.

- Under transport, the supply of motorised barges and ferries would have an immediate impact on the movement of goods and people within the country (profile K.6). It is important also to initiate plans for upgrading the entire road system (profiles J.1 and K.1).

- The telecommunications system of the country has suffered grave damage, and a high priority should be accorded to upgrading it (profile P.1).

- Finally, because of the immediate financial benefit to be derived from the tourist potential of the country, tourist plans should be drawn up without delay.

HISTORICAL PERSPECTIVE

The Khmer are an ancient people, having first settled in the basin of the Mekong some 4,000 years ago. The zenith of their influence was reached between the 9th and 13th centuries, culminating in the Angkor era when the great temples were built. Later in the millennium, they suffered at the hands of their stronger neighbours to the west and east, who periodically encroached onto their territory, and even occupied it for long periods. By 1863, however, Kampuchea had become part of French Indochina, and its present boundaries were then established. The advent of French rule undoubtedly saved the country from being carved up by its neighbours. The French helped develop the economy of Kampuchea while also reaping many of the benefits of this economic growth. Full independence was finally attained in 1953.

The first 10 years of independence were a period of consolidation and nation-building; but by the end of it, and in spite of the emphasis placed on social programmes during those early years, there was a growing sense of unease about the growing disparities between the rich and the poor, and between the towns - particularly Phnom Penh - and the rural areas. These factors, among others, prompted the government to adopt, in the early 1960s, new policies of internal self-reliance, and to cut back on external aid.

The 1960s and 1970s

By that time, the economy was delivering an income level of about US$110 per head, low compare with surrounding countries. Although growth rates of 7 percent per year were being registered during the early years of independence, they fell back to only 3 percent in the later 1960s, barely keeping pace with population growth. The reasons for this modest performance was that the agriculture sector as a whole, which accounted for 38 percent of the GDP, and employed 80 percent of the working population, was itself not expanding fast enough. Growth in industry was also slow, though manufacturing was the only productive sector to improve its performance as result of State enterprises commencing production in the later 1960s.

The country's financial institutions were radically transformed in 1963-64, when foreign banks were closed and domestic private institutions liquidated. A new, and much simplified financial structure emerged from this re-organisation, including a central bank, two state-owned commercial banks, a national investment fund, an agriculture bank, a cooperative financing entity called OROC (which provided money to farming cooperatives in an attempt to provide an alternative to the usurious rates which private moneylenders charged), and others. However, confidence in the whole system gradually eroded, and by the end of the 1960s a condition close to stagnation had set in. The nationalisation of the banking system, the failure by OROC to secure repayment on loans, the paucity of industrial credit, and the loss-making nationalised industries all contributed to this.

In 1970, a new administration took over, renamed the country the Khmer Republic, and sought to return to more liberal economic policies. However, successive escalations of the bombing and the takeover of much of the countryside by the Khmer Rouge very soon killed all hopes for an economic revival. All production indicators fell, and soon nearly half the population were living in beleaguered cities, having to rely on airlifted food supplies. There was a drastic falling off of exports, and the financial sector finally collapsed in 1975.

Throughout the entire period, the government was wholly dependent on support from the United States, since its spending had far outstripped possible tax revenues. The Khmer Rouge therefore inherited an economy in a state of collapse.

The policy of the 1975-78 Khmer Rouge administration was to harness almost the entire population to agriculture and the creation of new irrigation works. However, their efforts to increase rice production seem to have been mostly ill founded. Most, though not all, industry was abandoned; foreign trade was conducted through barter agreements with friendly countries; the money economy was abolished. By the time of the Vietnamese military intervention, the condition of the country was far worse than in 1975.

The 1980s

During the first two years of the new regime, only the foundations could be laid for economic recovery. As this report documents, it inherited a country close to chaos, with physical infrastructure and industrial plant destroyed, crops in ruins, draft animals halved in numbers, and no central administration. In the years that have followed, a remarkable recovery has taken place in all sectors, and although some of these achievements - such as rice production are still rather fragile - a good start has been made in economic revival.

Although statistics are not available, a ten-fold increase in exports is reported to have taken place between 1979 and 1988, notably in rubber, timber, beans and corn, but not yet in rice. These figures would undoubtedly be higher if the informal trade in gems and other commodities were to be added. However, imports have also risen at rates higher than exports. A significant volume of goods are imported under the assistance programmes of both the socialist countries and NGOs. Formally all such imports, as well as purely commercial ones, are subject to State licence; but in practice, a large volume - perhaps amounting to between $100 and 150 million a year - appears to avoid this procedure.

The Phnom Penh authorities appear to have adopted a pragmatic approach to economic management, notwithstanding the socialist planning goals of the party. In the hope of boosting agricultural production, they are in the process of restoring private land ownership; they have granted considerable autonomy to provincial authorities and state enterprise managements; and they have delayed the full introduction of a tax system.

The economy is operating under the guidance of a Five Year Programme covering the years 1986-90, with the stated objectives of increasing agricultural production, restoring the industrial capacity in selected ways including the development of the country's hydro-electric potential, expanding exports, consolidating state control of the major productive sectors, concentrating capital investments in certain "spearhead" branches of the economy such as the reconstruction of hydraulic works and basic infrastructure, and improving economic management. Some of these objectives may have to be modified in the light of the more recent decisions to open up the economy to private capital.

The Programme also outlined the role of the four main branches of the economy - the State, the collectives, the family, and the private sector - while a fifth, joint ventures, has now been added, reflecting the liberalisation of economic policy. This general policy re-orientation has been applied most quickly to the services sector, especially in domestic and to some extent in foreign commerce, but apparently not so far in financial services. The withdrawal of the State is also in evidence in the *krom samakki* (see box on page ix).

A notable omission so far which awaits attention is the setting up of rural credit, which could be rectified by reverting to the proposal of the 1960s to set up an agriculture development bank, encouraging new commercial banks with adequate rural networks, and/or exploring more innovative approaches relevant to the social conditions.

Since January 1989, the riel has been valued officially at US$0.0067, and in June of this year was valued in the market at $0.0052 (respectively CR 150 and 193 to the US$).

THE PEOPLE

During the past 20 years, the population structure of Kampuchea has been transformed. In 1962, the total population was about 5.7 million, and according to projections that were made at the time, the total number of people in the country should have reached between 10 and 12 million by 1989. The fact that the current population is only 8.4 million, not including the 325,000 people who are living in the border camps, clearly demonstrates that a drastic change has taken place. Between 1977 and 1980, deaths exceeded births, and the total population declined. Moreover, the effects of war and famine took a greater toll on the men than on the women, with the result that the proportion of women to men is of the order of 57:43, and may be much wider in some places. A further consequence of these events is the large number of families which are headed by widows or otherwise single women, emphasising the need to establish social programmes that will provide a safety net for these people.

The age structure of the population has also been affected. While definitive information is not available on this, surveys of Border Camp populations in 1988 show the population to be deficient in numbers of young man and women between the ages of 10 to 30. Although this deficiency has been partially made good by the numbers of children born during the 1980s, reconstruction efforts will certainly be hampered by the lack of people in these vitally important age groups.

The country is still predominantly rural in character. An estimated 88 percent of the people live in the countryside as distinct from the towns, a fact that emphasises the importance of rural occupations in general, and agriculture in particular, to the economy of the country. Some 70 percent of the people live in the lowland provinces associated with the Mekong and the Tonle Sap, which occupy only 25 percent of the land area of Kampuchea. In spite of the vast enforced movements of people that took place during 1975-78, the distribution of people on the land is once again about the same as it was in the early 1960s.

However, this distribution is likely to be affected in some degree by the return of the displaced people who are at present living in the border camps, the majority of whom are likely to settle in Battambang and other provinces in the north and northwest of the country.

Although the distribution appears to be the same, the extent to which people have returned to their places of origin after the diaspora, is not known. Certainly this was not the case with Phnom Penh itself, which had been forcibly evacuated in 1975. Its previous inhabitants had mostly perished or left the country; and in the early 1980s, it was repossessed by people who have yet to adapt to urban living, and who now pose problems to an over-burdened city administration.

Some aspects of the present population appear to be unknown: the size, for example, of the working population, a statistic that is vital for manpower planning. A census is urgently required to provide information on this as well as a whole range of statistical data that is currently not available. A high priority should therefore be accorded to the organisation of such a nationwide census (profile A.3).

AGRICULTURE, LIVESTOCK, FISHERIES, FORESTS

Kampuchea is indeed a predominantly agricultural country: it is estimated that some 80 percent of the working population is employed in the agriculture sector, which in 1969 contributed some 38 percent of the GNP. Farming, predominantly rice growing, takes place in the low-lying areas surrounding the Great Lake (the Tonle Sap) and the Mekong itself, which constitute only 30 percent of the country, yet support 90 percent of the people, and practically the whole of the country's economic activity. The remaining 70 percent of the land is classified as forest, which constitutes a reserve for farm land. The forests could play a more important economic role in the future than at present by use for plantation crops such as rubber, or by the increased exploitation of timber reserves. Eventually both arabica coffee and tea may also be grown. In sum, there is no scarcity of land in Kampuchea.

The hydrology of the country has extremely unusual features. The climate is irregular, especially the rainfall, which varies from year to year, and even within the same year. However, the peak of the rainy season coincides with the melting of winter snows in Tibet, causing the level of the Mekong to rise from about 2 metres in April/May to 9-11 metres in the flood season of August to October. As the river rises, it flows back to the Tonle Sap, resulting in the flooding of at least 2 million hectares each year, thereby fertilising the land and creating the conditions for an extensive rice culture. A number of different rice regimes exist along the banks of the river and the Lake, including an extensive floating rice culture, middle and late season rice. In fact, together with the rain-fed rice, the annual production of paddy averaged 2.5 million metric tonnes in the 1960s, and rice was the most important export earner in those years, with more than 0.5 million tonnes being exported in good years.

During the 1960s, rice was produced by small peasant farmers, who cultivated smallholdings of an average size ranging from 2 to 5 hectares. Rice fields occupied about 90 percent of the entire farmed area. Yields were generally low; in fact the average annual national yield used to be 1 tonne per hectare. Soil fertility seems to be poor, especially in rain-fed areas, these low yields being the result of irregularity of rainfall, flooding, lack of adequate irrigation and other inputs such as fertilisers. Improvement can only come if these inputs are increased; but in the case of irrigation, this may be difficult because of high costs. The most productive province during the 1960s was Battambang where, in 1963, some 700,000 tonnes of paddy were produced from 470,000 hectares.

Other crops were also grown in that period, including corn (the next most important to rice), beans, cassava, and ground nuts. Sesame, soya, and sweet potatoes were also grown. Fruit of all kinds were produced, including quantities of banana, pineapple, and mango; these were mainly for home consumption, but 25 percent was marketed. Sugar palm provided the basis for home and commercial production of sugar; coffee production was comparatively minor in importance, but is considered to have great potential if plantations are established in the forested red soils of the plateau. Finally, there was rubber, grown mainly in large and well managed plantations. The output in 1967 was 53,700 tonnes, providing the raw material for an expanding manufacturing base for the production of tyres in addition to substantial exports in crepe form.

The whole of the 1970s was a period of great disruption, during which the agricultural economy of the country underwent profound changes. Dislocations were caused by the military operations of the early years, and during the latter part of the period the entire population was mobilised to create new drainage systems (the so-called "Pol Pot canals"), and to plant and harvest rice. The use of cattle for field preparation was abandoned, and replaced by humans; cattle were herded together and used for transportation. In spite of these massive efforts, the productivity was not high; and by the end of the decade, the destructive effect of military operations compounded these problems and left the country virtually destitute.

In 1979-80, the people returned to their homes, there to resume their lives as peasant farmers. But the legacy of the 1970s was not so easily overcome. Quite apart from the physical havoc which had been wrought on the countryside, the character of the population had changed. The fact of there being many more women than men, and of many families being headed by widows had more difficult consequences in the farming community than elsewhere. The solution adopted by the Phnom Penh authorities was to establish the so-called *krom samakki* or solidarity groups (see box), by means of which the limited resources that were then available could be more effectively used, and support could be given to the more vulnerable members of the community.

From a low point of just over half a million tonnes in 1979, the annual paddy production has now reached an average of about 2 million during the past three years, or about 80 percent of the production in the 1960s. The main reason why this has not been surpassed is that only about 64 percent of the land that was under cultivation in the 1960s has so far been returned to production. The figure of 2.5

million hectares - that which was cultivated in the 1960s - cannot yet be reached because of insecurity, labour is short and the livestock population, which is vital for the preparation of the fields, is still seriously depleted. Furthermore, a shortage of tractors, particularly in the floating rice areas and in the Battambang plains, also inhibits production.

However, the above comparisons (80 percent of 1960s production on 64 percent of the land) suggest that there have been improvements in rice production and yields, in spite of these difficulties: there is evidence, for example, of increased use of fertilisers, of improvements in seed production, and a larger number of tractors available for agriculture than in 1969.

The information on the production of other crops is incomplete. It shows, however, that the production of cassava and sweet potatoes is considerably higher than in the 1960s, whereas that for corn is well down.

The krom samakki solidarity groups

In 1979, because of labour deficiencies and shortages of livestock, machinery and all other kinds of agricultural input, the Phnom Penh authorities organised agriculture on a collective basis. In essence the whole country was subdivided into krom samakki, or solidarity groups, each comprising 12 to 15 families, and each cultivating 15 to 25 hectares of land. In this way, it was hoped that a fairly even distribution of land would be assured, and the more vulnerable population groups such as widowed household heads, and the physically handicapped, would be supported.

In addition to the "community land", each family of the group was assigned 600-2,000 m^2 *as their own plot for house and private allotment garden. This was to encourage the growing of farm produce privately, either for sale or for household consumption.*

There are three levels of krom, corresponding to different degrees of collectivisation:

- *Level One: Is an entirely cooperative system, with little or no private production. All inputs and equipment are owned by the Group, and the yield is shared among the families after payment of collective debts and taxes.*
- *Level Two: all the land and equipment is divided among the families, and the land itself is worked by the family unit, who retain after-tax production for their own use. Important tasks such as ploughing, sowing, and harvesting are carried out collectively.*
- *Level Three: comprise family-based units which are essentially private farms, with labour and inputs provided by the family, and all produce sold privately. The sharing of work with the Krom is in this case arranged on an informal basis between families.*

In 1981, soon after the system was set up, 22 percent of the farmers belonged to Level One kroms, 57 percent to Level Two, and only 21 percent to Level Three. However, by 1989, some 90 percent of all kroms had become Level Three, which is likely to have a beneficial effect on the future levels of production, but may also remove an important security net from the less fortunate members of society.

During the past 10 years, Kampuchea has received some assistance to improve its agriculture, but not enough to effect a pronounced change. The Soviet Union and other members of the Socialist Bloc have assisted with the supply of tractors, trucks, fuel, cement, pumps and spares, as well as technical assistance for the management of rubber estates. The NGO community has also played a critical role in enabling the country to reach its present levels of production. Although this assistance has not always been well-coordinated, there is scarcely a single aspect of agriculture that has not received its share of this effort, from the provision of basic inputs to assistance in the setting up of a soils laboratory, from the up-grading of irrigation works to the supply of books. The International Rice Research Institute (IRRI), has also now entered on the scene to assist in the strengthening of rice research capability.

The Mission has identified the rebuilding of research capacity, and of national agricultural archives, as two of the most important measures designed to re-establish agriculture to its pre-1970s levels, and a proposed project for this purpose has been noted above. This is not the only priority, however. In addition, a system must be set up to gather and analyse production statistics so as to monitor performance; agricultural inputs must be made more readily available, perhaps through the private market; more people must be trained, particularly in the Ministry of Agriculture itself; the extension services need re-enforcement (profile B.2); and the technical colleges need wide-ranging assistance.

The reduction in the country's livestock population has already been identified as a primary reason for its inability to increase rice production. This is because oxen and buffaloes are used solely for ploughing, harrowing, and transportation in Kampuchea; moreover, they are usually yoked in pairs, even for light tasks, which, under current conditions of cattle shortage, may well be wasteful.

In the period prior to 1970, there was, in fact, a clear correlation between the numbers of livestock on the one hand and the area of cultivated land - and hence the production of paddy - on the other. In 1970, there were estimated to be just over 3 million oxen and buffalo, and rice production was 2.5 million tonnes. By 1979, the size of the herds had fallen by half, with a concomitant effect on rice production. Cattle have never been eaten by the majority of Khmer, nor have they been a source of income, except for the occasional sale of excess stock for slaughter.

In recent years, the numbers of head have been gradually returning to the 1969/70 levels. The most recent counts show there to be about 2.6 million, or about 86 percent of previous levels. But the herds are now more beset with disease than in the past, a legacy of the period under the Khmer Rouge period when they were herded together and inadequate attention was paid to disease prevention. Assistance from certain NGOs, has ensured that vaccine production has once more begun, and a refrigerated distribution system has been set up, with cold boxes at the provincial level. This experience will have to be built upon, and an efficient and effective disease control system will have to be set up including the establishment of a continuous "cold chain" including vehicles, cold rooms, refrigerators and cold boxes (profile C.1). The need to upgrade animal stock, both by vaccinating much larger numbers of animals (80 percent rather than 30 percent as at present) and by artificial insemination, is also recognised (profiles C.2 and 3, respectively).

Pig and poultry production was increasing rapidly in the 1950s and 1960s, and some beginnings were being made to set up a dairy industry with the assistance of FAO, as well as some bilateral donors. These have not been fully re-established, mainly because of the lack of feed, but also because vaccine is in short supply. Over the longer term, there may be a potential for developing meat production for export, but the whole industry needs review, to ensure that measures are taken to upgrade the stock.

The freshwater fisheries of Kampuchea are some of the most abundant in the world, particularly in the Great Lake (Tonle Sap). As the waters of the lake rise, they flood large areas of forest that surround it. The fish that inhabit the lake spawn in these areas, and as the water recedes again, the fish fry return not only to the lake itself, but to all flooded areas as well, and downstream to the Mekong. If this forest is cut back, as has happened, the ecological cycle will be disturbed, and the ability of the fish to reproduce will be diminished. Furthermore, if the Mekong itself is heavily silted, a significant part of the fingerlings and pregnant females are carried downstream to Phnom Penh rather than resting in the Lake. The urgent need to dredge the Mekong arises in this respect as well as to improve river transport.

In the 1960s, the Tonle Sap yielded 60 - 80,000 tonnes of fish each year, or about two-thirds of the total fresh water catch, which also included the fish caught in the dense network of small ponds and rice fields throughout the country. The Tonle Sap is fished by full-time fishermen, but other fishing is a family affair. In the past, half of the Tonle Sap yield was usually exported. Present production seems to be about two-thirds of this, and there are evidently several reasons why it will be difficult to increase it further. There are some signs that the ecological balance in the vicinity of the Tonle Sap has been disturbed by the events of the late 1970s; the flooded forests were cut down, and dredging activities on the Mekong have been insufficient to prevent excessive silting. Action must be taken to rectify both of these deficiencies (profile D.3).

There is also some evidence that the increased use of pesticides in the rice fields has had an adverse effect on catches. To investigate these and other problems, the applied research capability of Kampuchea will have to be enhanced (profile D.2). There is also a great dearth of fishnets and other equipment, and profile D.1 seeks to address this.

In contrast to the inland fisheries, the marine fish yield was only about 40,000 tonnes each year in the 1960s, and is even lower today. There are also many constraints preventing this potentially important resource from being developed further. The construction of a prefabricated cold storage unit close to Kompong Som may however stimulate production. But, as with the freshwater fisheries, lack of equipment such as outboard motors, nets and trucks, are still hampering progress.

In 1970, the FAO completed a forest inventory based on work that had been started ten years earlier by the *Institut de Recherche et d'Enseignement Forestier* with help from USAID. This showed that 73 percent of the land area of Kampuchea was forest covered. With a total annual timber production of about 400,000 m^3, about 25 percent of which was exported, the productivity of these forests was low. Of this figure, about two-thirds was classified as industrial timber and the remaining one-third was used for fuelwood, including wood for charcoal. Although the industrial timber was almost entirely used for the construction of houses and furniture in the country (excluding purely local use of timber, which was not included in these figures), a start had been made in the 1960s to set up a plywood factory (with Chinese assistance), and pulp and paper based on bamboo and rice straw.

The importance of timber as a source of foreign exchange has prompted the Phnom Penh authorities to lay stress on a rapid expansion of forest exploitation. By 1988, the annual production of timber had reached 200,000 m^3, of which one-quarter was exported, mainly to Viet Nam and countries in Eastern Europe. The extraction is undertaken by a variety of means, from *krom samakki*, to large scale foreign timber firms. The authorities are negotiating logging concessions with some neighbouring countries with a view to expanding the production of commercial timber. The policy is to promote the export of sawn timber rather than logs, and an agreement has been negotiated with the Japanese for the construction of a modern mill in addition to the numerous large and small sawmills that exist in the country, many of them quite inefficient. Over and above these totals, it is estimated that about 100,000 m^3 of timber is used for firewood, and this poses a threat to forests, particularly in the vicinity of Phnom Penh.

During the 1970s, the forests were seriously depleted by warfare and curtailment of the national reforestation programmes that had been initiated during the previous decade. There is a fear that forest exploitation may proceed at a rate that is prejudicial to their long term regeneration, in spite of the actions that have already been taken to establish nurseries, and plant millions of seedlings. To enable the authorities to assess the current status of the forests, it is essential that the 1970 forest inventory should be updated without delay (profile E.1). Assistance may well be required also to prepare a new forest code, and to enhance the capability of the Forestry Department to plan and monitor the exploitation of the country's forests, and to formulate reforestation programmes (profile E.1).

MINERALS

The geological mapping of Kampuchea was first undertaken in the 1930s by the *Service Geologique de l'Indochine* as part of a wider survey for the whole of Indochina. It was updated by the then Government of Cambodia with French technical assistance between 1966 and 1970. The country is therefore now covered with one-degree square sheets.

In the 1970s, a number of minerals were being exploited: clay for ceramics, dolomite for glass-making, limestone for cement, gold, pagodite, phosphates, quartz, silica sand and precious stones. The extent to which many of these minerals are still mined is not known. In other cases, such as the famous gem mines of Pailin, there has apparently been continuous exploitation. Much of this has been illegal, and efforts to control it have been hampered by the poor security situation.

During the 1960s, several prospections were initiated by French and Chinese specialists, and under a UNDP project. They investigated a number of metalliferous prospects, including bauxite, iron, copper, lead, manganese, molybdenum, tin, zinc, and gold. Limestone, kaolin industrial clays, and coal were also investigated. Few of these investigations yielded deposits of economic dimensions. However, minerals in sufficiently large quantities were found for the manufacture of cement and lime in Kampot province; and a small, but exploitable phosphate deposit was also found. And in the case of lead, zinc and copper, as well as bauxite and coal, further prospection may be warranted in specific areas that have been identified in previous studies.

The extent of current operations is not known, but they are probably not very important. In any case, apart from the minerals that have been specifically mentioned above, it is doubtful whether a high priority should be afforded to this sector. Nevertheless, at some time in the future a comprehensive review might be undertaken of the existing literature on the subject, and of the extent of past and present mining operations, in order to provide a basis for future programmes of work (profile F.1).

MANUFACTURING INDUSTRIES

Following independence, the new government vigorously promoted state enterprises; but in spite of considerable efforts, by the mid-1960s factories in public ownership only accounted for 7 percent of the manufacturing value added, a higher proportion being earned by private unincorporated enterprises (just under 60 percent), and mixed enterprises (34 percent). State control in a wide range of industry and discrimination against private enterprise and the nationalisation of the state banking system served to extend the role of the state in manufacturing. At the same time, some attempts were made to diversify production away from the staple food processing industries.

By the end of the 1960s, a new liberal policy was introduced by the government of the Khmer Republic, and the country seemed to be on the brink of a new industrial expansion, with US aid once more providing massive assistance, and the World Bank being invited to consider support. In the event, however, little was achieved; much of the industrial capacity was destroyed by military action, and the government was steadily losing control of the countryside. In the succeeding three to four years, some industrial activity was established under the Khmer Rouge, but little survived into the 1980s.

By the time that the new regime had been established in 1979, much of the previous capacity was in ruins, damaged by war, neglect, or subsequent looting. In the first few years, industrial activity was revived by two separate kinds of initiative: the re-establishment of small-scale artisanal factories and the attempts on a government level to revive larger-scale industry. Provincial administrations now seem also to be joining in this latter approach; and encouragement has more recently been given to joint ventures - and even 100 percent foreign enterprises. Earlier gains in public sector industrial output have been eroded, however, only partly through the transfer of some activities to the private sector. In fact, in 1988, production of the State factories was only 14 percent higher than in 1979, a disappointing outcome after the earlier gains of the mid-1980s.

In order to boost industrial production once again, a number of activities of an inventory and pre-feasibility nature may be required to determine how to facilitate the role of the state in industry, and to identify opportunities for public and private investors. Four such activities could be initiated without delay.

- The first of them (profile G.1) would assess the present state portfolio so as to determine its general viability, the policy framework within which it should operate, whether to maintain state (or provincial) control over investment etc., and what assistance would be required to improve all-round performance. Such an assessment could provide the government with the necessary basis for determining a strategy for each of its industrial enterprises.

- The second activity (profile G.2) is to undertake feasibility studies in the agro-industrial sector, the objectives of which would be to set up a capability within government to undertake such studies, and to carry out assessments on certain potential new or expanded activities into areas where the prospects seem good. As a first priority, studies might be carried out for the processing of sugar, fruit juice, vegetable oil, starch and/or animal feed. As before, such assessment could provide a basis for government decisions on whether to undertake more detailed studies, and whether to involve private enterprise - and if so in what form.

- The third broad area of action is more specific, and involves a pre-feasibility analysis for an integrated textile mill, the primary objective of which would be to determine whether there is scope for such a new facility in the short or medium term (profile G.3).

- Finally, comprehensive assistance could be considered for the wood processing industry (profile G.4). Forest-based industries should comprise one of the country's major sources of value added, and government should intervene decisively to provide assistance in several aspects of forestry management, log and timber exploitation, and in the whole range of wood processing from pulp and paper to wood carving.

Apart from the above studies, industrial activity could be assisted in a variety of ways, to maintain or improve production in existing units so that they attain a degree of financial self-reliance following commercial investment and enterprise reorganisation. Examples might include the promotion of long-fibre cotton, and of mulberry cultivation and sericulture, and phosphate exploitation. Furthermore, a number of possible commercial activities might be suggested for potential investors' consideration, including the setting up of cold storage facilities for fish and seafood, the renovation of Kompong Som brewery, and the rehabilitation of one or more of the government's textile mills. Complete lists of these suggested industries will be found in the main report.

Apart from any investment that the state might retain or make in manufacturing activities, it could play three important roles to facilitate the development of a viable industrial sector: it could provide a satisfactory legal, fiscal and administrative environment for industrial investment, it could assist the entry of new Khmer entrepreneurs by providing a range of support services, and it could provide the necessary infrastructure for industrial growth. Policies will have to be developed in such areas as foreign investment (for which, it is understood, a law currently awaits ratification); support services for all industries will have to be established, including the provision of statistical and other information on the availability of labour and raw materials; technical standards will have to be set up; and technical training provided. There will also be a need to set up a fully functioning financial sector, to extend the present range of services to meet the needs of industry, especially small scale enterprises. Finally, the country's infrastructure has to be upgraded to enable the free movement of all kinds of goods.

WATER RESOURCES

All activity, including manufacturing, is at present constrained for the lack of power, and one of the main keys to the future development of Kampuchea is likely to be the successful harnessing of its water resources for power and irrigation. The unusual hydrology of the Mekong-Tonle Sap system, which is described elsewhere in this report, is but one facet of this. The Mekong itself, which every year deposits some 475,000 million m^3 into the sea, is a huge, under-utilised resource. If all this water could in some way be harnessed, it could supply more than 150,000 GWh of power and irrigate an estimated 6 million hectares of cultivated land; other benefits would include the control of the more damaging floods, and the creation of a more reliable waterway for inland shipping.

The lower Mekong basin embraces land which falls within the territories of Laos, Thailand, Viet Nam and Kampuchea. Almost the whole of Kampuchea lies within the basin, with the exception of the area to the southwest of the Cardamone Mountain range. Already in the 1950s, efforts were made through the UN Regional Commission, ECAFE, now the Economic Commission for Asia and the Pacific (ESCAP), to encourage the riparian countries to cooperate in developing this vast resource; and these initiatives culminated in the establishment in 1957 of the Committee for the Coordination of Investigations of the Lower Mekong Basin (the Mekong Committee). Although it has not participated directly in the work of the Committee since 1975, Kampuchea was a founding member; so it is to be hoped that a political settlement will enable Kampuchea once more to benefit from membership of the Committee.

The first activity of the Committee after its formation was to collect data on the rainfall, streamflow, topography, soils, and general environment of the basin. This was to provide the basis for the preparation of a Basin Plan and of individual project proposals. Over the years, the Committee's secretariat has assisted member countries to develop and maintain a basin-wide network of hydrological and meteorological stations, but events in Kampuchea have caused a serious interruption in the data gathering in the country over recent years. Great benefits will accrue, both to Kampuchea itself, and to the system as a whole, when this process is re-established (profile H.2).

A number of possible projects have been studied by the Committee's Secretariat, but most interest would centre on the resumption of work on the Prek Thnot project. Located on one of the tributaries of the Bassac some 80 km west of Phnom Penh, it was a multi-purpose project designed to provide an average annual output of 50 million kWh from an installed capacity of 18MW, an effective storage capacity of 670 million m^3, and irrigation for 5,000 hectares during the first stage rising eventually to an ultimate coverage of 70,000 ha in three provinces. Funding for the first phase of the project had been secured to the extent of some US$20 million from 12 countries and the UNDP, to which the then government of Kampuchea had contributed a further $9 million. Construction began in 1969, but work on the main dam was halted in 1971, by which time about 20 percent of it had been completed; other works proceeded until 1973. In view of the fact that substantial investments have already been made in Prek Thnot, and in consideration of the likely benefits to Kampuchea, a re-appraisal study should be initiated without delay to recalculate the costs and benefits (profile H.6).

While large-scale irrigation works are of obvious value over the longer term, their implementation is likely to be severely limited for some time to come by lack of capital, of trained engineers and hydrologists, and of heavy equipment. This focuses on the need for small scale irrigation works, including the further development of groundwater reserves. Many NGOs have concentrated on providing pumps for irrigation and water supply: OXFAM alone has distributed 2,000 of them, and the contribution of UNICEF has been critical as well. Groundwater reserves have not, however, been adequately studied, and it might be considered worthwhile to undertake pilot schemes for the southern provinces of Kandal, Takeo, and Kampot to establish and exploit the aquifers there (profile H.7).

It would be desirable to prepare a general "master plan" for the future development of the delta region of the type that is now being undertaken with UNDP assistance for the Mekong delta in southern Viet Nam, with UNDP assistance. Such a study would take into account the annual rainfall pattern, the areas of flooding, and the present land uses; hydraulic models would be prepared, taking into account the existing natural regimes including the possible viability and use of the so called "Pol Pot canals", on which so much human effort was expended. It would provide a basis for possible decisions on future land uses in the area.

Over and above all else, is the need to provide training at all levels to Khmer engineers, much of which would be possible through the activities of the Mekong Committee.

ENERGY

At the time the World Bank's 1970 Economic Mission, the assumption was that the Prek Thnot project would be coming on stream in 1973-4, and that this would at least provide sufficient power for the then immediate future. Under those circumstances, the Mission concluded that priority should be assigned to the improvement of power distribution in Phnom Penh, which was about to be studied with assistance from two UNDP financed projects. In fact, work was interrupted at Prek Thnot, and nothing was done in Phnom Penh. Aside from short-term emergency assistance provided by the Soviet Union to supplement thermal power generation in the city, the situation remains substantially as it was then. Moreover, the oil refinery at Kompong Som (Sihanoukville), which the Bank Mission considered should be studied to provide the basis for a future thermal power station there, has also been badly damaged.

Some prospection for oil, gas and coal had already taken place in the period before 1975, and it is strongly recommended that the results of this work be reviewed, in the hope of reducing Kampuchea's dependence on imported fuel. A full energy study is urgently needed to project power demands and balance them against the supply side. Such a study was undertaken by the World Bank Mission in 1970, and now needs updating (profiles I.4 and 5).

In the meantime, emergency assistance is needed to shore up the power supplies of the main cities, particularly in Phnom Penh itself, where the lack of maintenance and repairs have rendered parts of the whole system dangerous. The supply of small auxiliary generators, together with distribution equipment, might well ease the present situation everywhere in the country.

For the longer term, the best prospect is to restart construction on the Prek Thnot hydro-electric project, and a re-appraisal study should be initiated on this as a matter of high priority. Such a study would also have to encompass the need for distribution lines, and the installation of power lines around Phnom Penh, connecting the city to Prek Thnot and Kirirom. It is considered that a large scale new thermal power station of 60-90 MW may also be required, perhaps located in Kompong Som (profile I.3).

TRANSPORT AND COMMUNICATIONS

By 1970, a good framework had been established for the development of a system of transport and communications in Kampuchea. There were some 3,000 km of national highways, two railroad lines linked the capital with Thailand in the northwest and Kompong Som (Sihanoukville) in the southwest, where a new deep-sea port had recently been constructed, and river transport moved passengers and goods along the 1,240 km of inland waterways. Two international airports had been constructed at Phnom Penh itself and Siem Reap; and the beginnings of a phone system had been installed. Ten years later, the entire system had suffered from the effects of war and neglect; and a massive effort will be required to rehabilitate it. The first step in this process is to prepare an inventory of the current status of infrastructure in the country, assess local capabilities to undertake the tasks of reconstruction, and recommend a phased development programme for all sub-sectors (profile J.1). A necessary concomitant will be to assist in strengthening institutional capabilities in all fields (profile J.2).

The eight primary road arteries of Kampuchea all radiate from Phnom Penh and have an aggregate total length of about 2,000 km. Originally paved with asphaltic materials, they suffered serious damage during the 1970s. Just over half of these roads (1,100 km in all) have so far been rehabilitated, but even these are often rebuilt to standards that are unsuitable for heavy traffic. With pavements and shoulders that are too narrow, and with inadequate foundations, they are also liable to flooding during the rainy season because embankments are too low.

Most national roads have two lanes, but speeds are limited by the road conditions: for example, it takes nine hours to travel the 291 km between Battambang and Phnom Penh. Bridges are often single lane or steel temporary structures with severe load restrictions. The exception is RN4, connecting the capital with Kompong Som, which is 7 metres in width and was built with American assistance in the 1960s to higher specifications.

It is understood that in 1969, there were more than 36,000 cars, trucks, and buses in the country, but the greater part of these were destroyed in the period that followed. Traffic volumes were not excessive then: counts on major roads ranged from 500 to 2,500 vehicles per day, distributed evenly between motorcycles, light and heavy vehicles. Recent estimates of truck traffic along the Phnom Penh-Battambang road (RN5) indicate a volume of about 500. In the meantime, and particularly since the middle of 1988 when vehicles began to be imported from Singapore and Thailand, the number of vehicles on the roads has increased dramatically. Currently, there are estimated to be at least 55,000 vehicles in Kampuchea, 80 percent of which are two- and three-wheeled vehicles.

The rehabilitation of the road system has been started in spite of acute staff limitations. To progress, however, further assistance will be required at two levels. At the planning level, there is a need to establish a master plan for the rehabilitation of all national highways, including realistic programmes for the implementation of such a plan (profile K.1). At the more practical level, there is a grave shortage of road-making equipment of all kinds, and this should be supplied (profile K.2). On a longer term basis, the reconstruction of certain priority sections of the road network will have to be tackled (profiles K.3 to 6).

The main railway line between Phnom Penh through Battambang to the Thai border at Poipet was constructed between 1930 and 1940. It is a metre gauge single track, and was to have been part of the former Indochinese network connecting Bangkok with Ho Chi Minh City, then Saigon. Its main function in the 1960s was, however, to link the rice-producing province of Battambang with Phnom Penh; it has carried no international traffic since 1961. The other line, which connected the capital with Kompong Som (then Sihanoukville), was built in the 1960s, the final link from Kampot to Kompong Som being completed only in 1969.

The railways then carried both passengers and freight; but whereas the passengers carried by the railways increased rapidly, at an average rate of more than 10 percent a year between 1965 and 1968, freight traffic fluctuated greatly in the same period. This was because the principal freight was agricultural produce, which accounted for two-thirds of the cargo carried by the railways. Passenger-km averaged out at 135 million at that time, and freight tonnage at 276,000, 80 percent of which was transported between Battambang and Phnom Penh.

The whole system suffered greatly during the 1970s. Some 80 percent of the bridges and half the roadbed were destroyed, and have been partially rebuilt on a temporary basis. Rail traffic currently moves between Phnom Penh and Kompong Som, and on the Battambang Line as far as Sisophon; but the roadbed beyond that point to Poipet on the border has been completely removed. Much of the rolling stock has been destroyed. Out of 37 diesel and steam locomotives that the country possessed in 1968, only 12 remain; and half of the 742 passenger coaches and freight cars have gone. It will clearly not be possible to return the system to its status in 1968 unless this rolling stock is replaced, and more heavy equipment of all kinds is provided, to enable repairs to be made to the line itself. (Profiles L.1 and 2 respectively are concerned with these requirements, and L.3 deals with the reconstruction of the vital Poipet-Sisophon link.)

Until the year 1960, the only maritime port in Kampuchea was on the Mekong at Phnom Penh itself. In its heyday in the early 1960s this port was handling between 700,000 and 900,000 tonnes of cargo a year, brought there in ships of up to 4,000 dwt. By the end of that decade, however, cargo tonnage had fallen to 140,000, reduced by the escalating war in the southeast of the country. At the same time, the tonnage being handled in Kompong Som (Sihanoukville) increased rapidly from 34,000 tonnes in 1960 to an average of more than 800,000 tonnes a year during the last years of the decade. Although Kompong Som was formally opened in 1960, it was not completed until 1965, by which time, ships of 10,000-12,000 dwt could berth there. The only other port of consequence was on the coast at Kampot, where cargo was handled by lighterage.

Annual volumes of cargo are now much less than before; in 1988, only 120,000 tonnes was landed in Phnom Penh and 203,000 in Kompong Som. In both places, there is clearly a potential for increased capacity. Warehousing space is available in both ports; in Kompong Som, this includes covered warehousing amounting to 39,000 m^2 and 57,000 m^2 of open storage. However, a study is now needed to provide a basis for the future planning and operation of both ports, as well as equipment to improve cargo handling (profiles M.1 and 2).

Historically, inland waterways have provided the most reliable form of transport in Kampuchea; although at one stage it was thought possible that this mode might be superseded by road and/or rail, but this has decidedly not happened. Indeed, for certain parts of the country, it may remain the only mode for some time to come. Making use of the Mekong, the Bassac and the Tonle Sap, the inland waterway network runs through the most densely populated parts of Kampuchea, carrying passengers and freight.

There are no reliable figures for the amount of freight carried during the 1960s, but the number of passenger-km carried by the system has been estimated at 80-140 million a year at that time, a level of usage that is comparable to that of the railways. The fleet then comprised some 63 vessels of different types, each of more than 50 tonnes, as well as 2,400 unpowered barges and junks; it is now about half that figure. If river transport is to regain its previous importance - and there is no reason why it should not - several actions need to be taken, to overcome the damage and neglect of the 1975-1978 period: mooring facilities will have to be improved and both the Mekong and the Tonle Sap channels need dredging to enable larger vessels of 200-300 tonnes to travel up to Siem Reap during six months of the year (profile N.2). Indeed, there is a great need for a revised hydrographic survey to be undertaken of the whole system, to provide the basis for the preparation of revised navigation charts. New channel markings also need to be installed as aids to navigation (profile N.1).

In the 1960s, there were two international airports in Kampuchea, in Phnom Penh and Siem Reap, and some 30 smaller airfields. Traffic was concentrated in the two larger fields. Although passenger movements recorded in 1968 were low on world standards - just over 60,000 a year for Phnom Penh and just under 50,000 for Siem Reap - the numbers were increasing very rapidly every year. For Siem Reap in particular, improvements had been undertaken of both the runway and the terminal buildings, so as to enable increasing numbers of tourists to visit the temples at Angkor. The amount of freight traffic was extremely small, amounting to no more than 400-800 tonnes a year in either direction. Royal Air Cambodge, a small airline with under joint Khmer/French ownership, was the national carrier. For a short period in the early 1970s, it is understood that there were a number of small charter airlines in the country, but these disappeared in 1975.

As with other sub-sectors, physical plant suffered serious damage during the period since then. Work has however recently been started to improve the Pochentong airport in Phnom Penh by extending its runway. However, the facilities in Siem Reap have seriously deteriorated, and will require wholesale rehabilitation, both of runway and terminal buildings, before they can again be extensively used by international air traffic. Kampuchea Airlines now operates a small fleet of five aircraft, including two Soviet-built jets, with assistance from the Soviet Union. Further assistance will certainly be required to rebuild institutional capacities in both the airline and the civil aviation authority, as well as in reconstruction of the physical plant (profiles O.1 and 2).

In telecommunications, there were just under 8,000 telephones in Kampuchea in 1969, about half of them in Phnom Penh, 1,000 in Kompong Som, and the rest distributed amongst the smaller district capitals. International telecommunications connected Phnom Penh with important Asian cities such as Tokyo, Hongkong, and Singapore, as well as Paris. Although there is at present no detailed inventory, it appears that some equipment has survived and is in service; but the service does not work well. In Phnom Penh itself, some 2,200 telephone numbers are apparently in service. An Inter-Sputnik ground satellite station, built in 1986 with Soviet assistance, has been in operation since early 1987, through which international calls are now routed via Moscow. There is no public telex or facsimile service. Assistance will certainly be necessary to design and construct an expanded telecommunications system (profile P.1).

URBAN DEVELOPMENT

Kampuchea is not a heavily urbanised country: it is estimated that only 12 percent of its population live in towns, or just over one million people. Of these, the great majority - perhaps as many as 800,000 - are resident in Phnom Penh and its environs, the remainder living in small provincial towns. According to most recent estimates, the largest of these is Battambang, with a population of about 45,000, followed by Kompong Cham with 33,000. The remainder are 11-16,000 in size. Apart from Phnom Penh itself, the only formally established municipality is Kompong Som, the seaport originally called Sihanoukville. There are strong signs of economic revival, not only in Phnom Penh itself, but in these smaller places as well, and every effort should be made to build on this so as to divert population pressure from Phnom Penh.

In the Phnom Penh of the 1960s, conditions of life were much better than for the country as a whole. This fact, together with the dominating role of the city in the life of the country, was causing concern to the government of the day. Attempts were being made to formulate urban policies that would create alternative growth poles in the country, and equalise the general living conditions in town and country. But apart from the establishment of Kompong Som, where attempts to set up a "free zone" were not successful, little was achieved. One undoubted consequence of this failure to act, was the stern anti-urban bias that informed Khmer Rouge policies of the late 1970s.

The need for an urban development policy is just as urgent today, in spite of the non-urban character of the country. The central role which Phnom Penh plays in the affairs of the nation can be judged from a review of virtually every sector, and although in some ways this may be inevitable, and even perhaps be beneficial in economic terms, it is less acceptable as a social policy. There is a need to develop an urban development policy that will seek to enhance the economic and social status of smaller towns, and so make them more attractive as destinations for migrants and in some way diminish the role of the capital city. The suggested instrument for this policy is the upgrading of public services in such towns and a proposed project would lay the basis for this (profile Q.1).

The need for such a policy arises also from the condition of Phnom Penh itself (see box), where increasing difficulties are being met to accommodate the great numbers of people who have already come to the city from the countryside. The plight of Phnom Penh is, to a lesser extent, shared with that of the smaller provincial cities, but not to the same extent.

And in any case, the cost to the community of rehabilitating these small towns will be a fraction of that which will be required to put things right in the capital.

HEALTH

The health care system of the 1960s laid stress on the delivery of medical services. The necessary structures were all in place, from the training of doctors and pharmacists in well-established schools, down to the health centres, infirmaries and dispensaries that were distributed throughout the country. Some 99 hospitals with almost 5,500 beds, most of them government-run, were available for the treatment of disease. In spite of this, however, the general health of the people was, according to a United Nations study at the time, not of a high standard. The rural communities suffered from malaria, dysentery and other diseases associated with poor environmental conditions, and malnutrition was a "persistent menace". Nevertheless, a framework had been created on the basis of which further improvement would have been possible.

The plight of Phnom Penh

Twice in the last thirty years, Phnom Penh has had to absorb hundreds of thousands of people fleeing from the ravages of war, once in the 1950s and then in the early 1970s; and twice have these people left again. In the late 1950s, they went back to a comparatively quiet countryside; but 20 years later, an entire population of between 1.5–2.0 million was forcibly evacuated, leaving behind them a lifeless shell to stagnate and moulder away. Many of those who lived in the city during those days have fled, were killed, or died in the years that followed.

Conditions in the city in the 1970s were already bad, and further aggravated by the huge burden of additional people that it had somehow to accommodate. Pre-investment studies had been initiated into the water supply and sewerage systems under UNDP auspices; and money was being sought to upgrade power distribution as well. None of this work was done, and a further 15 years of inadequate investment has now rendered these systems at best faulty, at worst downright dangerous. The sewers leak raw sewage into the pipes that supply the water, creating a serious risk of a major epidemic, to say nothing of the day-to-day incidence of intestinal disease of all kinds; and power lines fall on the street below.

When the city was repossessed, the people who occupied it were mostly from the countryside – about 70 percent of them according to one estimate – and unused to urban living. They have added to Phnom Penh's problems by importing rural ways in the densely built central parts of the city. UNICEF and a number of NGOs (notably OXFAM and PADEK) have been working at the grassroots level to bring about improvements in living conditions in the city, but admit that much of their work is frustrated because the necessary large-scale investments in urban services are not being made.

Efforts are being made by a hard-pressed municipal administration to overcome these problems; and in some ways, the city is enjoying a boom. But the time is now ripe for a major effort to be made to provide Phnom Penh with upgraded urban service systems and a new development framework, a city plan that can be used as a basis for a wide range of new investments for the remainder of this century (profiles Q.2 and 3).

This entire structure was swept away in the period between 1975 and 1978, so that when the present authorities in Phnom Penh set about re-establishing a viable health service, they had to do so from scratch. Fewer than 10 percent of the 500 or so doctors had survived; hospitals and health centres had been destroyed; even the most basic of medical equipment and supplies were lacking. In re-creating a health system, the authorities sought to place more stress on communal health care than on curative medicine. But, because the orientation of the surviving health workers from the older system was more towards the latter, the system that now exists is in effect a curative one.

At the base of the new system are the district (*srok*) health centres, and the commune (*khum*) infirmaries. In 1988, there were 1,457 *khum* infirmaries, each serving up to 8,000 people, and staffed by 3-5 health workers who have received one year's post-primary school training. The *srok* health centres, of which there were 154 in 1988, deal with those patients who cannot be treated at the *khum* level. The principle is that those with a serious condition are referred on to the provincial hospital, but shortages of funds and means of transport inevitably inhibits this whole process.

The system is certainly in place; but its staff are often inadequately trained, have few drugs at their disposal, and lack medical equipment.

By 1988, there were some 10,000 medical personnel in Kampuchea, trained in a variety of medical centres located in Phnom Penh and in certain of the provincial capitals. Training and up-grading is an important and necessary feature of the health care system, because of the acute lack of trained manpower and the low basic educational standard. In this respect, the NGOs have been especially important, providing short courses in maternal health, vaccination, health care and so on. The main medical schools and training institutions themselves have woefully ill-equipped laboratories, insufficient training materials and publications of all kinds. Material and technical assistance are needed to upgrade the health training establishments, and profile (R.3) has been drawn up for this.

Although figures are hard to come by, there appears to be a high incidence of disease, particularly among young children. In this age group, it is estimated that one in five children fail to reach the age of five years, probably due in the main to respiratory and diarrhoeal diseases. In response to this acute threat to the life of the nation, UNICEF has been collaborating with the health authorities in Phnom Penh to launch an Expanded Programme of Immunisation (EPI), whose goal is to vaccinate 80 percent of all children under five years of age against the six main target diseases by the year 1990. At the same time, it is hoped to inoculate 80 percent of all pregnant women against tetanus, which is also a scourge. Furthermore, the RINE project (Integrated Rehydration, Immunisation, Nutrition and Education) has been started up with UNICEF and NGO support, and there are now 11 RINE centres in Phnom Penh and 12 in the provinces. Good public health practice among mothers and children is generally promoted through these centres, but there is a need to integrate them more fully in a general health strategy for the nation as a whole.

Malaria is a particularly serious health problem, and statistics covering the period up to 1986 show the incidence of the disease to be on the increase. Drugs are in short supply, and experience is lacking in the health staff. Permanent technical advice is especially needed in the treatment of this disease, which should be fully integrated into the health care structure.

There is great scope for widening the scope of environmental sanitation, and in this respect too, UNICEF and NGOs such as OXFAM (UK) and Lutheran World Service have been very active restoring municipal water supplies and providing pumps for wells in the villages and hospitals. The provision of clean, safe drinking water for the entire population must be counted a very high priority in any future aid programme (profile R.2).

Some pharmaceutical factories have been set up, particularly with aid from the Soviet, Vietnamese and other Eastern Bloc countries; and medical teams have been sent in from the national Red Cross societies of Poland, Czechoslovakia and the GDR (East Germany). Western aid has mainly come through the NGO channels. Profile R.4 has been drawn up to assist drug production in the future.

In all, it has been estimated that NGO aid to the value of about US$10 million was delivered to Kampuchea during 1988, and out of slightly more than 100 western aid personnel in Kampuchea during the same year, about 40 were health professionals. For the future, assistance will certainly be needed to draw up comprehensive plans for a nationwide health system that fully respond to the imperatives and priorities as detailed above (profile R.1).

PRIMARY AND SECONDARY EDUCATION

General public education has a relatively short history in Kampuchea, and spread rapidly during the first years after independence. By 1968/69, there were estimated to be more than one million children enrolled in the six years of primary education, and about 118,000 in secondary schools. They were taught by about 25,000 primary school teachers and 5,500 at the secondary level.

Ten years later, little remained of this. The schools had been disbanded, the teaching staff dispersed or killed, and the buildings destroyed or used for other purposes. In 1979, all possible measures were initiated to re-establish primary education; they "crash-trained" teachers, re-opened schools often in makeshift shelters, and encouraged children to re-enter at primary level. According to official records, more than 800,000 pupils started their schooling in the first academic year of 1979/80, 80 percent of them in grade [illegible]hough this figure is certainly too high, it gives an indication of the high levels of achievement that were needed to cope with a considerable backlog of uneducated children. The system is now having to cope with the "baby boom" of the early 1980s, and statistics indicate an annual enrolment of between 400,000 and 500,000, with a retention rate (the proportion of children who stay on past the first grade to higher grades) of about 66 percent.

Enrolment at the lower secondary level was also re-established at an early stage, but the re-starting of higher secondary education took longer to achieve, partly because those who would normally have entered at that level were called upon to teach. Complementary programmes of adult education and literacy have also been initiated (see box overleaf).

Although standards and curricula are established at central level, the administrative and financial responsibility of running the system, including the setting up of teacher training, is vested in the provinces. In practice, primary school construction is taken over by local communities, which means that standards vary greatly. Secondary schools, which benefit a wider community, appear to attract provincial funding, and are generally in better condition. Standards of teacher training are improving, and in spite of the poor conditions in which it often takes place, some 36,000 have been trained or retrained for primary level instruction through the "crash training" system, as well as 6,400 for lower secondary and just under 500 for higher secondary schooling.

UNICEF and a number of NGOs have provided considerable assistance during the past 10 years. In the early years, this assistance went mainly into construction and supplies; but latterly it has been directed into the upgrading of regional teacher training centres and publishing of school books as well. There is a concentration of effort in the more populous provinces of the south, an emphasis which will have to corrected in the longer run. The needs for long-term material and technical assistance to upgrade schools and print textbooks are addressed in profile S.3 and 4 respectively.

In all, considerable progress has been made in re-establishing an educational system that is open to all. But there has been an inevitable price to pay: such a rapid expansion has been achieved with some compromises in educational quality, relevance, and efficiency. The task of improving quality is being achieved by the gradual strengthening of pedagogical skills and curriculum development; the setting up of a School of Educational Planning and Management should assist in this process. But there is now perhaps a need to confront more basic questions: for example, is the present system responsive enough to the present and future

Overcoming Illiteracy

As in many other Buddhist countries, great emphasis is placed on the achievement of universal literacy in Kampuchea. In 1969, the literacy rate was given as 41 percent, but this certainly declined during the 1970s.

In 1979, a large-scale programme for adult education and the eradication of illiteracy was set up. Some 34,000 volunteer instructors were mobilized to achieve this, most of them teachers, civil servants and students, remunerated with small stipends in cash or rice. It was expected that some 150 hours of instruction would be given over six months, after which the students were expected to be able to read, write, and make simple calculations similar to those set in class 1 of the regular education system.

Two campaigns have been launched. The first, in 1980-83, claimed to have rendered some 570,000 people functionally literate, or about 55 percent of the target population of adults between the ages of 13 and 40. As result of a second campaign between 1984 and 1987, it is claimed that more than 90 percent of the same target population are now literate, but it is thought that this figure is probably based more on the numbers attending classes than on a true assessment of the situation.

Continuing encouragement is being given to illiterates in the 13-35 age groups to go to literacy classes. This is part of a general objective to upgrade the achievement levels of all adults in that age group to that of a pupil who has passed through the first year of primary education. This program deserves further support, and profile S.2 addresses this.

needs of Kampuchea? Should changes be introduced into the curriculum? How should priorities be set, and what should they be? Assistance may well be needed to help develop plans for the future development of primary and secondary education; and, once these are made, large scale aid programmes will have to be set up to reinforce the considerable progress that has already been made (profile S.1).

TECHNICAL AND TERTIARY EDUCATION AND TRAINING

Prior to 1965, the only institution of higher education was the Royal University, which had seven faculties or schools, and an enrolment of almost 7,000 students. By 1969, however, a rapid expansion had taken place with the establishment of eight more universities and eight *grandes ecoles*, with a student body of more than 11,000 in all. Courses were available in a wide spread of subjects from the fine arts to engineering; and in addition to the concentration of schools in Phnom Penh, centres of higher education had been set up in Kompong Cham, Battambang, and Takeo/Kampot. In that period, higher education was generally based on four year curricula following completion of 12 + 1 years of schooling. Instruction was entirely in French, and generally based on French curricula and pedagogy. Students were sent abroad, generally to France, for graduate studies.

In 1975, all of these institutions were closed down. The sole initiative taken during this time was to set up a technical school to train some 300 engineers in a 7-year programme of instruction in Phnom Penh in 1978. By 1979, all else had gone, and moreover the proportion of fully qualified professionals remaining in the country ranged from zero in law to 10 percent in medicine and about 20 percent in education. Those who survived have often been called upon to combine the roles of policy maker in government, university professor and practitioner in their respective fields.

In the past 10 years, efforts have been made to re-establish higher education; but because of limited human and financial resources, there has been only partial success.

Some eight institutions have now been opened, including Phnom Penh University (formerly the Royal University), which once again has a student body of nearly 7,000. The schools that have been most completely restored are those offering teaching in health, education, agriculture, and fine arts. The science faculties have so far not been re-established; and training in civil engineering, which should be a priority for the country at its present stage, is entirely lacking.

Despite the progress made in re-establishing a system of higher education, the present system has a number of deficiencies. The teaching is theoretical, the practical side of it hampered by lack of laboratories and a failure to build field work into the courses; the teaching is often by rote, and dependent on the memory of those who have been called upon to teach or on the chance availability of texts; instruction is often given in a foreign language, and in many cases there are no agreed texts in Khmer - and even when there are Khmer texts, there are too few books available.

Technical training in certain subjects also takes place both inside and outside the ministries, and suffers from the same handicaps as higher education. However, as more and more graduates return from training abroad (some 2,000-3,000 students have apparently been sent for study to Eastern Europe over the past ten years) some of these problems may be resolved. But more wide-ranging support is certainly needed to overcome the present shortages of equipment, buildings and decent living quarters. The extent to which expatriates can make good the deficiencies in teaching staff is likely to be hampered by a lack of interpreters and translators from their own language to and from Khmer. One type of expatriate assistance which could well be drawn upon is that provided by overseas Khmers, who could be recruited through the UNDP-sponsored "TOKTEN" scheme (see box) or other similar arrangements.

Over and above all else, the need for the authorities to establish a clear policy on a second language is nowhere more important than in technical education; for it will only be through this means that students will gain access to

The UNDP's TOKTEN scheme

A large number of the world's educated people were born in developing countries, but these same countries have been unable to benefit from the "know-how" that their native sons and daughters have acquired.

TOKTEN or the Transfer of Knowledge Through Expatriate Nationals grew from a search by the United Nations Development Programme for a means whereby such expatriates could return to benefit their homelands by carrying out consultancies in their fields of expertise. Many developing countries have set up UNDP projects designed to harness this vital human resource, and such a project might eventually provide benefits for Kampuchea.

The advantages inherent in the TOKTEN approach are many. In the first place, shared language and traditions facilitate communication and skill transfer. Second, since the principle is that TOKTEN consultants volunteer their services, and waive their normally high fees, costs are very low; the host country contributes travel and living costs from UNDP project funds, while developed country institutions with which the expatriates are affiliated may cooperate by continuing to pay their salaries while they are away. Third, recruitment is usually fast; and fourth there is the possibility of continued follow-up taking place between expatriate and counterparts - even, in some cases, to the extent of the expatriate eventually deciding to return permanently to his homeland.

Governments decide on areas of priority in which skills are needed; when they have done so, TOKTEN can provide highly skilled individuals motivated to serve their homelands in their specialised fields.

material which, for many years to come, will be impossible to render into Khmer.

During the earlier years of reconstruction, there was so much work to be done simultaneously that there was little risk of duplication, and not even a problem if different systems of instruction developed. However, there are now so many institutions that contradictions have started to emerge, and there is a need to set up mechanisms to evaluate the present system, identify gaps in it, and prepare long-term plans for its future development (profile T.1).

VULNERABLE GROUPS

The decade of the 1970s has left an indelible mark on Khmer society in terms not only of lives lost, but also of women who were widowed, children who were orphaned, and people of all ages who have been maimed or otherwise handicapped by wars and mines. In terms of pure numbers, it is the widowed women that are the most important of these vulnerable groups.

Women

The events of the 1970s have effectively created a society in Kampuchea in which there are at least 30 percent more women than men, and a great number of these are widowed heads of household - perhaps as many as one in four in places. It is in fact possible that up to 15 percent to 20 percent of the entire population may be dependent on widows for their sustenance. These facts not only have implications on the potential of the country to regenerate its economic life, but also impose on the authorities the need to devise social programmes to assist these unattached women.

In traditional Khmer society, women played a role that complemented that of men: the women cooked, the men repaired the house; the women transplanted and harvested the rice, the men performed the heavier tasks of working with draft animals to plough and harrow the land. In 1979-80, when the people returned to the land, they sought to re-establish these traditional ways; but for women without men, and with families to support, this became very difficult to do. Not only were they without their partners, but they often found that their houses needed rebuilding, and shortages of draft animals imposed the necessity of performing arduous tasks in the fields. It was to assist such persons, among other reasons, that *krom samakki* were initially set up (see box on page ix); and the recent trend towards a less cooperative form of *krom* is likely to increase the difficulties confronting single and widowed women.

The 1985 Constitution formally established equality between the sexes, enabling women to participate fully in the political, economic, cultural, social, and family life of the country on equal terms with men. This a consolidation of trends that were already apparent in the later 1960s when, for example, 45 percent of all children entering first grade at school were girls - though the proportions of women in higher education was much lower. A review of women's present participation in higher education indicates that progress is being made: for example, 25 percent of the students in medical schools are women, and there is an unsubstantiated claim that 30 percent of the country's university graduates are women.

In general, women have had to shoulder a much larger share of the total work load of the society as a whole than before because of the sex disparities noted above, and it is particularly the widows that have had to carry this additional burden. Society as a whole will probably have to accept that these disadvantaged people will need some kind of support, either directly in the form of additional pensions, or indirectly through projects that are specially tailored to their needs. Sympathetic responses from all aid-givers will be called for in this respect. Under profile U.1, it is proposed that a thorough review be made of problems being faced by women, and on page iv above, a proposal is put forward for a priority project to provide immediate assistance to selected groups of women.

Other disadvantaged

There is no tradition of orphanages in Khmer society. In the past, orphaned children were looked after by the extended family. However, the authorities have had to set up orphanages to provide homes for some of those who lost all relatives in the conflicts. Although there are no reliable statistics, there were reported to be some 200,000 orphans in 1979, but this has more recently dropped to 75,000. The great majority of these children have been looked after in the communities in which they lived, a small percentage - just over 3,000 - are now in orphanages. The problem is, of course, growing less as these children enter the work force.

Disabled groups include amputees who have been maimed by mines, the elderly, the physically disabled, and the mentally sick. All of these have had to receive attention, and many groups, particularly the amputees, have been receiving assistance from NGOs on both sides of the border. The needs of these people will have to be taken into account in planning for future health services in Kampuchea. These are areas in which NGO assistance should be strongly supported in the future.

CULTURE AND TOURISM

The vast Angkor temple complexes, which are part of the world cultural heritage, provide evidence of a long and proud history. But, to the Khmer themselves, there is another inheritance, a less tangible part, which is expressed in dance, music and literature, and is of equal importance to them and is a vital part of their own cultural heritage. It is this that was submerged and partially destroyed during the late 1970s, and which is now being slowly and painstakingly reconstructed.

Parts of the material heritage have been lost through active destruction, neglect or pilferage during the period since 1970. Angkor itself seems to have escaped major material damage, though years of neglect have caused some deterioration to individual monuments. Restoration work is in process with the assistance of Indian professionals; but the time has perhaps come for an international symposium to be convened on Angkor, to review its current status and make comprehensive proposals for its full restoration (profile V.1).

The other main area of assistance will be that of replacing manuscripts and documents that are missing from the Phnom Penh museum, and rehabilitating those fragile manuscripts and other documents that remain. It is understood that work has already been initiated on this, but a worldwide search may be necessary to locate copies of these lost documents and return them, at least microfilm form, to the museum.

By 1970, there was a small, but growing, tourist industry based mainly on short term visits to the Angkor monuments. The World Bank Mission considered that Kampuchean destinations would prove attractive to tourists not only for visits to Angkor itself, but also to beach and island resorts - provided they were secure. At present, a small but rapidly rising volume of tourists are arriving, still however measured in hundreds per quarter rather than the tens of thousands who came each quarter in 1969.

A national directorate-general of tourism was established by the Phnom Penh authorities in 1988 in anticipation of the possible renewal of tourist interest that may follow a political settlement. There is as yet no comprehensive plan, though laws and guidelines are being prepared to guide the industry, and several practical actions are in hand to promote it. Hotels are being renovated and new ones are either being built or are at the discussion stage with foreign developers; discussions are taking place with airline operators to increase flights to and from Phnom Penh; some staff are being trained and private tour operators encouraged.

INTERNATIONAL RESPONSES

Apart from the massive United Nations humanitarian assistance noted below, Kampuchea has been cut off from almost all major sources of international aid for the past 15 years. Although considerable assistance has come from the Soviet Union and other Eastern Bloc countries on the one hand, and from a number of dedicated NGOs on the other, the country's general condition is such that an assistance programme of much greater proportions is now called for.

In the past, Kampuchea was not so isolated. During the 1960s it was receiving its fair share of international assistance, and was able to achieve a good measure of social and economic progress as a result. The United States was delivering a massive aid programme in the 1970s. The UNDP and the major UN Specialised Agencies were represented in the country until 1975, and a wide-ranging programme was in progress. The FAO in particular made a distinguished contribution to the development of agriculture. In addition, considerable support was received from ECAFE (the UN Regional Commission), and membership of the Mekong Committee enabled the country to benefit from the activities of that organisation. By 1970, the Asian Development Bank had opened up lines of credit and the World Bank was considering becoming involved. In 1975, all this came to an end; apart from some assistance from the People's Republic of China, all aid ceased until 1979.

Between 1979 and 1981, there was a brief period during which the country benefited from massive humanitarian aid and assistance through the United Nations. It has been estimated that, of the total of more than US$600 million that was dispensed at that time, just more than half was provided for Kampuchea itself, and of that, one-half was for emergency food. With the remainder of the money, a large-scale programme was mounted mainly to restart agriculture (with FAO and WFP assistance), education and health (with UNESCO and WHO), and the reconstruction of infrastructure. Another $130 million was spent to support the displaced persons in the border camps.

This came to an end in 1981, when it was judged that the emergency phase had ended; and, apart from the important work of UNICEF, WFP, and UNHCR, UN agencies have not been able to contribute to the rehabilitation of the country.

It is uncertain what the present aid flows to Kampuchea itself amount to; but some estimates have put the figure for 1989 at about US$30 million from all sources including UNICEF, WFP and UNHCR. There are at present some 120 full-time expatriate personnel presently resident in Phnom Penh, the great majority of whom are working in the medical and agricultural fields. They have also brought in short-term consultants for specific needs. The scope and content of the assistance from the Soviets and Eastern Europe is not known, but is thought to be quite substantial. For instance, there are estimated to be more than 2,000 Khmer away on fellowships.

The other main recipients of aid at present are the border camps, which is managed by UNBRO. Although concentrating on the provision of humanitarian assistance in the form of food, there have also been some efforts to upgrade the skills of the people in the camps in such a way that they will be able to contribute to life when they return to Kampuchea.

I. Nation, Economy and People

A. NATIONAL DEVELOPMENTS

1. Origins of the Khmer

The Khmer people have an ancient history, having occupied the area that is now known as Kampuchea since the beginning of recorded history. They are said to have moved into the Mekong Basin from the north, some 4,000 years ago, and are both physically and culturally quite distinct from the Thais (Siamese) to the West and the Vietnamese to the East.

Although the earlier parts of this history are obscure, by the 9th century a powerful civilization had emerged based on the capital of Angkor. In its heyday, the suzerainty of the Angkor kings extended over large parts of what is now Thailand west of Bangkok, of Laos as far as Vientiane, and of the entire delta of the Mekong in southern Viet Nam. It was in those years that the builders of Angkor (Angkor Wat itself dates from the 12th century) also developed an advanced system of irrigation to support the rice-growing culture that already existed in the lowlands of the Tonle Sap and Mekong river, and provided the basis for a flourishing realm.

Kampuchea was then governed by a dynasty which had been founded by Jayavarman II, who ruled the country from 800 onwards. Khmer cultural and political traditions derived from the Indian heritage of Funan, whence its Buddhist religion also came. The Khmers remain predominately Buddhist, belonging to the Hinayana or Theravada School which also predominates in other countries of Southeast Asia. In the 1960s, the Sangha or Monkhood retained a substantial influence in social and even economic affairs in the countryside, the pagodas being not only important religious sanctuaries but educational establishments as well. Although much of this influence was lost during the Khmer Rouge period, there are current signs of its revival.

The kingdom was gradually extended until reaching its apogee in the reign of Jayavarman VII (1181 - 1219), the builder, irrigator and introducer of Buddhism. From the 13th century onwards, the southeastward movement of the Thai people gradually began to erode Khmer dominance. Angkor itself was abandoned in 1431, when the irrigation systems began to fail, and the inroads of the Thais forced its evacuation.

During the 14th and 15th centuries, the political and economic centre of Kampuchea moved to Phnom Penh, enabling the rulers then to take advantage -- via the Mekong River -- of the maritime trade routes that were then starting to open up.

In the second half of the 17th century, first Champa and then Viet Nam emerged to pose a threat to Khmer sovereignty from the east; and by the end of the next century, the main competition was between Siam on the west and Viet Nam on the east, with Cambodia eventually emerging as a semi-independent state, subordinate to both of its large and more powerful neighbours. The boundaries of the state had shrunk from those established by the Angkor kings, a result of recurrent internal strife and incursions by these larger powers.

2. Protectorate and Independence

a. French rule

The establishment of a French protectorate in 1863 in effect saved Kampuchea from being carved up by Siam and Viet Nam. In its initial stages, French authority rested lightly on the country; but the boundary demarcation between Viet Nam -- by then a fully-fledged French colony -- and Kampuchea was to the latter's disadvantage. Successive Khmer administrations protested to the French about this, maintaining that the lines were drawn more on the basis of administrative convenience than on historic or ethnic lines.

Meanwhile, under the Protectorate, numbers of Chinese and Vietnamese came into the country, and started to play increasingly important roles in its commercial, industrial and financial life.

- For the Chinese, this immigration was centuries-old, and much assimmilation had taken place between the Chinese and Khmer peoples. However, the more recent of them came to form a closely-knit community mainly within the towns, with their own language and schools -- though the teaching of Khmer was compulsory.

- The Vietnamese, on the other hand, also settled in the countryside, and were active in the fishing of the Tonle Sap. They were much used by the French for administrative jobs. Despite the resentment that this caused within the Khmer community, this did not stop the Vietnamese from joining the Khmer in anti-colonial uprisings, and the two communities lived in peace for long periods. But crises and external factors invariably brought latent prejudices to the surface.

The French rule was maintained until the 1940s, even though it was often subjected to challenge. In 1884-85, a serious rebellion broke out in many parts of Cambodia in response to moves by the metropolitan power to take over the running of the Government from the King; but this had little effect on the way the country was later run; and, after it, the French rule sat heavily on the country, depressing living standards in their drive for exports, and requiring the payment of heavy taxes.

Protests of a political nature against this taxation took place, including one of 100,000 people to Phnom Penh in 1916; it was non-violent, and once again failed to change the country's administration. The country as a whole remained peaceful, though there was endemic banditry which was largely without political content. The western provinces of Battambang and Siem Reap were recovered from Siam in 1907. A small but vigorous independence movement became active from 1936 onwards, and was suppressed by the French in 1942.

Socially, the colonial power appears to have had relatively little effect on the country. Vickery has noted:[1] *Well into the 20th century...the Cambodian social structure remained much as it had always been: at the very top, a royal family; in the middle, a small class of bureaucrat-aristocracy who depended on royal favour and tradition for their status and wealth. At the bottom were the ordinary people, engaged in agriculture or service occupations, and constituting, before the 1950s, about 90 percent of the population. The small commercial sector was mainly foreign, especially Chinese.*

b. Japanese Interlude and Independence

In 1941 Thai forces, encouraged by the Japanese, attacked the French and obtained a peace treaty under which the western provinces reverted to Thailand and became a centre for the independence movement. The latter was also encouraged by the Japanese. For most of the period of their occupation of Southeast Asia, however, the Japanese left the pro-Vichy administration in Phnom Penh undisturbed. In 1944 they moved to displace it, and in March 1945 they afforded the young King Norodom Sihanouk (who had been installed by the French in 1941) the opportunity to proclaim his country's independence.

After the war, the French resumed control, but a period of intense popular political activity followed, culminating in the formal Declaration of Independence on 9 November, 1953. This received full and final recognition at the Geneva Conference on Indochina in 1954. The following year, Prince Sihanouk abdicated his throne and founded the Sangkum Reastr Niyum (People's Socialist Community), seeking to unify all streams of political opinion. His party gained all seats in the election of 1955, and in all subsequent elections through 1966.

The first 20 years of independence saw significant changes in the social structure. To quote Vickery again: *...the bureaucracy increased severalfold, providing opportunities for many to move out of agriculture into urban life. The school system was expanded to meet the demand, and an entirely new* petit-bourgeois *sector appeared. As some industries were created, a small proletariat formed, consisting first of former peasants, but by the late 1960s increasingly of urban school-leavers who* *could no longer find places in the administration.*

During the first decade, the management of the economy reflected the Government's emphasis on political consolidation and nation-building. Massive programmes were initiated for the promotion of education, health and general welfare. These efforts were aided by financial assistance from abroad, which averaged more than US$50 million a year. The United States alone contributed some $350 million over the period, with other large scale assistance coming from the French and the Eastern Bloc countries. Savings increased, and GNP grew at an average compound rate of 6.5 percent a year.

However, there was a growing sense of unease in the country about the increasing disparities between urban and rural incomes, and the conspicuous wealth of the business community. These, among other factors, caused the government to terminate US aid and attempt to put the country on a different footing. A new era of self-help was inaugurated, accompanied by the initiation of certain economic reforms, including the nationalization of banking and insurance and a prohibition of the operation of private firms in these fields, as well as the nationalization of foreign trade.

Due partly to the effect of the new policy approach (causing the withdrawal of foreign and local private banks and trading houses, partly to the failure to raise rice yields, and perhaps partly to side effects of the war occurring in neighbouring southern Viet Nam, economic growth slowed to around 3 percent in the late 1960s, little more than population growth. At the same time, domestic unrest manifested by the right-wing Khmer Serei and the left-wing Khmer Rouge was being only partly neutralized by the government's adroit political manoeuvering.

Another important aspect of this period was the country's unofficial involvement in the Viet Nam war through the provision of sanctuaries as well as conduits for supplying the Viet Cong guerillas in rebellion against the Republic of South Viet Nam. Much of the country was affected, since supplies from North Viet Nam and its backers came both down the "Ho Chi Minh trail" and through the new port of Sihanoukville (since renamed Kompong Som).

In 1968-69, some tentative steps were taken to stimulate the economy and to distance the Kingdom from North Viet Nam -- by restoring diplomatic relations with the US, readmitting foreign aid and encouraging foreign investment. Although the only economic measure actually implemented was devaluation, the World Bank mounted a comprehensive mission, presumably to lay the groundwork for lending operations, and its 1970 report foresaw reasonable prospects for economic recovery provided the planned reforms were carried through and inefficient State capitalism was restrained.

3. The Past 20 Years

a. The Khmer Republic

The late 1960s saw a more aggressive stance against the use of Cambodian territory to supply the provisional revolutionary government of South Viet Nam (the so-called Viet Cong), Prince Sihanouk appointed a more right-wing *Gouvernment de Sauvetage* led by his Defence Minister General Lon Nol and cousin Prince Sisowath Sirik Matak. These officials, representing a coalition of the urban elite and officer corps opposed to North Viet Nam, overthrew Prince Sihanouk in a March 1970 coup and later that year replaced the Monarchy with the Khmer Republic which received immediate US recognition. Meanwhile the People's Republic of China continued to recognize Prince Sihanouk who, in exile, proceeded to ally himself with the left-wing Khmer Rouge guerillas in a Royal Government of National Union (GRUNK).

Initially the new Government in Phnom Penh tried to pursue the policy of neutrality in the Viet Nam war more rigorously than in the past. But it soon became unable to prevent the overt extension of the war to Cambodia, and fell into an uneasy alliance with the US and the Republic of South Viet Nam.

Both ground fighting and US bombing within the country were escalated in the 1970-73 period, causing massive destruction and displacement of people. The latter, along with the disruption of rice production, was further aggravated by the concurrent civil war between the Phnom Penh forces and the Khmer Rouge which progressively strengthened its hold over the countryside. The civil war continued after the bombing ceased in 1973, and the traditional economy all but vanished. The capital, its population swollen by refugees from the villages, became totally dependent on imported supplies -- wholly airlifted once the Mekong River route fell into rebel hands.

b. Democratic Kampuchea

Phnom Penh finally fell to the victorious Khmer Rouge forces in April 1975, just 13 days before Saigon fell to the Viet Cong. Democratic Kampuchea was established, with Prince Sihanouk as nominal Head of State until he was replaced by Khieu Samphan a year later. Meanwhile a new constitution, abolishing the monarchy, was approved.

Pol Pot, the secretary of the Communist Party of Kampuchea, emerged as Prime Minister in the DK Government, which concentrated on radically reorganizing the Khmer society and maintained few relations with the outside world over the next two years. It continued to draw support from China, however, especially in connection with its continuing conflict with the newly reunited Viet Nam.

By 1978 this conflict had escalated from border skirmishes and bitter rhetoric to widespread warfare, a war which culminated in Viet Nam's military intervention and the withdrawal, mainly westward, of the Khmer Rouge cadres in December of that year. In January 1979 Phnom Penh fell once again.

c. People's Republic of Kampuchea

The Vietnamese intervention brought the establishment of a new administration in Phnom Penh: the Kampuchean People's Revolutionary Council (KPRC) with Heng Samrin and Pen Sovann as President and Vice-president. This was based on the National Union Front for the Salvation of Kampuchea,[2] which had been formed shortly before the intervention, mainly by exiled Khmer living in Viet Nam.

The KPRC was the sole organ of State during the 1979-81 period, when the country was dependent on a massive humanitarian aid effort to prevent starvation. It was preoccupied with supervising the resettlement of millions of displaced people, rebuilding and staffing the normal administrative machinery of government and of law, restimulating food production and other economic and commercial activity (including the reintroduction of currency and banking), and re-establishing urban life.

In 1981, elections were held for several levels of local administration and for a National Assembly, which adopted a new Constitution. A State Council and a Council of Ministers were formed, with Heng Samrin and Pen Sovann respectively presiding in these organs, although the latter was soon replaced as Prime Minister by Chan Si (and more recently by Hun Sen).

In 1981 the People's Revolutionary Party of Kampuchea (PRPK)[3] was created as the major force in the Front. Most of the officers of the Party also held senior posts in the Front and/or in the Government. Both of these include non-Party people as well, however, and over the past few years, observers have noted increasing separation between the Party and Government structures -- at least at provincial and lower administrative levels.

The political, social and economic organization of the people was further facilitated by the development in the early 1980s of "people's revolutionary committees" at the levels of city ward (*sangkat*), sub-district (*khum*), district (*srok*) and province (*khet*); and of several mass organizations, such as the Association of Kampuchean Trade Unions, the Kampuchean Women's Association (KWA), and the Youth Organization. These and other organizational structures, especially rural solidarity groups (*krom samakki*) are discussed in Chapter V.E below.[4]

Since 1982 the focus has been on reconstructing the economy and society, including the drafting of new criminal and civil codes, the creation of economic infrastructure, the stimulation of agricultural production and, most recently, formal encouragement of private enterprise. However, continuing Khmer Rouge activities and the absence of foreign assistance other than from socialist countries and western-based non-governmental organizations (NGOs) have been a constraint on economic development.

d. Opposition groups

Although the PRK was immediately recognized by Viet Nam, Laos, the USSR and several other Eastern Bloc countries, its legitimacy has not been acknowledged by most other UN member countries. Moreover, the country's UN seat was retained initially by the exiled DK regime and subsequently by the Coalition Government of Democratic Kampuchea (CGDK). The latter includes three political-cum-military forces:

- the Patriotic and Democratic Front of Greater National Union of Kampuchea (PDFGNUK), as the successor to the Khmer Rouge's Communist Party of Kampuchea, led by Pol Pot, Khieu Sampan, Ieng Sary and other former Party leaders;

- the Khmer People's National Liberation Front (KPNLF), the largest of several right-wing movements emerging from the Khmer Serei, led by Son Sann, a former Prime Minister under the Monarchy; and

- the Sihanouk-led Moulinaka-cum-FUNCINPEC (*le Mouvement pour la Liberation National du Kampuchea* and the National United Front for an Independent, Neutral and Co-operative Cambodia)

The activities of the CGDK and its composite forces have been concentrated mainly on maintaining international recognition; continuing sporadic military actions against PRK and Vietnamese troops; administering camps on the Thai border containing refugees and "displaced persons" (see Chapter VI.C below); and, in the case of the Khmer Rouge, exercizing control over small, mainly jungle, areas inside the border.

B. ECONOMIC PERFORMANCE AND POLICY

1. Historical Perspective

a. 1952-1969 performance

By the end of the 1960s, when the population was around 7 million, the Cambodian economy was delivering an income level of about $US110 per head. This low level, which could be compared with $150 for neighbouring Thailand at that time, was attributable to relatively low agricultural yields and modest industrial value added. The World Bank's 1970 report[5] noted that the economy's annual growth rate averaged 5 percent during the whole 1952-69 period, but only 3 percent in the last few years of that period while population continued to grow by 2.5 percent. Although engaging about 80 percent of the population, agriculture, forestry and fishery produced only 38 percent of GDP in 1969 and had grown at less than 3 percent a year during two decades. Commerce was the next largest sector, with 21 percent of GDP after growing by 5.4 percent a year, followed by Government with a 16 percent share and a high 11.5 percent growth rate. Construction had grown slightly faster to account for 6 percent of economic activity, while manufacturing had grown by 6.3 percent to achieve a 12 percent share.

After developing at an encouraging pace in 1952-56, the first five years of independence, the economy stagnated in the second five years, with declining production and exports of rice and rubber. A record rice crop spurred a general recovery in 1963, taking value added in construction and industry to a third above their 1960 level. This was short-lived however, since the rates of increase declined after the nationalization of foreign trade, banking and several other sectors from 1963, and the phasing out of US assistance at the same time. The economy's annual growth rate fell from 7 percent during 1956-63 to 4 percent during 1963-68, when fledgling manufacturing was the only productive sector to improve its performance as a result of State enterprises commencing production. Export proceeds showed no growth during that period, remaining around $US90 million a year, while imports could be restrained to about $US97 million due to the import substitution production of the State manufacturing enterprises.

The growth rate of agriculture fell below that of the population in the mid-1960s, with rice exports declining from a peak of 800,000 to 100,000 tonnes, rubber exports being affected by declining world prices and then in 1969 by defoliant damage, and fish exports almost disappearing altogether. Meanwhile commerce and construction barely recovered to their 1963 levels. Tourism growth also had been constrained, although its prospects seemed good by the end of the decade.

Both the manufacturing and the government sectors continued to grow strongly, but the World Bank noted that, even if private enterprise had not been constrained, neither the manufacturing sector nor the domestic market were large enough for industrial growth to give much impetus to the whole economy. Moreover, many State factories had dubious economic feasibility, often disguised by the environment of fixed prices and monopoly positions.

b. The financial sector

The country's financial institutions were reformed radically in 1963-64 when foreign banks were closed and domestic private institutions liquidated. Until then the sector comprised a central bank (BNC), four Khmer-owned commercial banks (BK, BCC, BS and BPP) and five foreign banks (BCCI, BI, BFC, CB and HSB), a mixed enterprise insurance company (SKA) and some other non-bank institutions. By 1969 the nationalized structure comprised:

- the BNC which issued currency, made advances to the Treasury, other government entities, producers and traders, rediscounted commercial paper, and controlled all foreign exchange transactions;

- two State-owned commercial banks - Banque Khmere pour le Commerce (BKC) and Inadana Jati - with branches in major provincial towns;

- a national investment fund (CNE) which was being converted into a development bank after lending to industry on a very modest scale;

- a newly established agricultural bank (BAPAY) which intended to make short, medium and long term loans and to mobilize rural savings (along with village level agricultural funds (CRC);

- the Royal Office of Cooperation (OROC) which advanced short term credits to agricultural cooperatives;

- a national insurance monopoly (SNA) for all non-life cover, with profits provided to the Treasury; and

- the Government pension fund (CPCK), which deposited its resources with the Treasury.

For several reasons the country's internal credit situation had reached a critical condition by the end of the 1960s, placing a significant constraint on both agricultural development and private investment in manufacturing, tourism and other potential sources of growth.

First, the nationalization of the banking system had reduced both its efforts to mobilize savings and public confidence in it. These effects caused a flight into currency, the share of which in the stock of money rose from 48 to 75 percent between 1962 and 1969 while bank deposits halved in 1964 and in 1969 were still below their 1962 level even in nominal terms.

Second, the operations of OROC had expanded rapidly during the decade, but many of the cooperatives to which it lent funds became paralyzed by problems of repayment. The proposed solution of establishing a new agricultural bank had yet to be implemented.

Third, very little industrial credit was available from the undercapitalized CNE, and private enterprises could not turn to the commercial banks because of their lack of deposits and the central bank's very restrictive rediscount policy. The latter was one element of a generally conservative monetary policy, which successfully restrained inflation but at a high cost in terms of foregone economic growth.

Finally, the loss-making State manufacturing enterprises and, for most of the decade, the Government sector itself were absorbing considerable shares of what credit was available.

c. Public finance

During the 1960s there were six major and several minor groups of agencies with budgets which together accounted for about half of public finance, leaving a like amount for the national Budget itself. The latter was supported by about 80 percent of collected taxes, but did not include foreign grants and loans. The main off-Budget entities were:

- special accounts, such as an exchange compensation fund which collected more import surcharge than it paid in export subsidy, the national lottery, and a fund for participation in State enterprises and subscription to the CNE;
- the Ministry of Planning, which was intended to handle all public investment expenditure but had lost this role by the end of the decade;
- provincial and municipal bodies, collecting some taxes but relied mainly on the Budget;
- public administrative institutions such as universities, hospitals, the Crown, the tourism office, receiving subventions from the Budget;
- pension and social security funds; and
- the CNE, funding some major public projects as well as operating as a development bank.

Other entities such as the Sangkum political funds, the Red Cross and the Chief of State's funds for relief donations and rural credit were relatively minor in amount. In addition, however, some State enterprises were acting as fiscal entities since their monopoly positions allowed the imposition of effective taxes which were seldom transferred to the State, while others received effective subsidies through their failure to pay dividends.

The taxation system was highly complex with over 50 different taxes, mostly inherited from the French protectorate, but 75 percent of tax revenue came from four of them: excise, turnover, import and income. Tax revenue absorbed around 19 percent of GDP, with another 3 percent taken by other elements of consolidated revenue. The World Bank noted in 1970 that this level was not low since most of the burden was borne by the 20 percent of the population outside agriculture, but was hardly sufficient to support the dominating role which the public sector had taken on.

On the expenditure side, the rapid growth of about 20 percent a year in current spending, which was enabled by US assistance and rising tax revenues up to the early 1960s, could not be sustained after 1963. Spending on education and social services had acquired so much political momentum that cuts in these areas were difficult, but the Government managed to restrain its Budget deficit through zero or low growth for defence, economic services and general administration. Thus overall growth in current expenditures were held below 4 percent a year. More significantly, public investment was held below its 1963 level and all of this was financed by foreign aid, drawdown of assets and central bank credit.

d. The 1970s: economic collapse

i. The war

The hopes for economic improvement being expressed when the Government announced a return to more liberal policies in 1969-70 were shattered when the 1970 military coup and successive escalations of the bombing and the civil war over the next four years threw the economy into disarray. By the time the Khmer Rouge entered Phnom Penh in 1975 normal economic activity had virtually halted. Public finances were completely bankrupt, with defence spending reaching more than twice total revenue by 1973, and the economy had become almost entirely dependent on US aid and the operations of the black market.

Rice production had fallen steadily: 3.8 million tonnes in 1969/70, 2.7 million in 1970/71, 2.1 million in 1971/72, less than 1 million in 1972/73 and only 760,000 tonnes in 1973/74. In the latter year the bombing peaked and collectives were being organized by the Khmer Rouge which by then controlled most of the countryside. Soon nearly half the population were living in beleaguered cities and relying on airlifted food supplies, initially partly from the Battambang area but later all from abroad.

Meanwhile production of the country's main export commodity, rubber, had also been sharply reduced -- from over 50,000 tonnes a year in the late 1960s to an average of 10,000 tonnes in 1970-74. Similarly, much of the industrial sector suffered considerable damage during this period. It has been reported that in 1974 only 300 rice mills and 65 saw mills were still operational, the phosphate and paper mills were destroyed, and serious damage had occurred to cement and textile capacity.[6] The general destruction of infrastructure would anyway have precluded normal economic activity.

The country's inability to feed itself, let alone generate agricultural surpluses, was reflected in a drastic deterioration in the balance of trade. Exports fell from SDR 66 million in 1969 to slightly over SDR 1 million in 1974 and imports were reduced from almost SDR 100 million to SDR 23 million over the same period. The deficit (including service payments) reached SDR 83 million in 1972 before falling to an estimated SDR 45 million in 1973 and SDR 22 million the following year, yielding a cumulative total of SDR 234 million over the five year period.[7]

As indicated above, the collapse of the financial sector began in the early 1970s as bombing and civil war prevented normal economic and commercial activity. Its destruction was completed as a deliberate act of policy in 1975, and thereafter only real exchange transactions could occur, including for foreign trade.

With respect to public finance, the 1970-74 Khmer Republic Government was wholly dependent on US support since its spending, especially on defence, had far outstripped possible tax revenues. During the Khmer Rouge period the nationalization of almost all economic activity removed the concept of a separate government sector.

ii. The DK period

Economic recovery was attempted by the Khmer Rouge administration mainly in rice cultivation, public works associated therewith, textile production, metallurgical industries, electricity and a few other economic activities. Normal forms of commercial and economic organization and technology were eschewed, with emphasis being placed instead on extraordinary human activity which must have resulted in very low productivity.

In many sectors further degradation occurred as the financial and commercial systems were abolished and as infrastructural and productive capital assets were either destroyed or operated inefficiently and without maintenance. Even in those activities to which the Government harnessed the population that did not either die or take refuge abroad, the quantity and/or quality of output were severely constrained by the highly labour intensive methods -- often without proper technical supervision -- and radical production techniques that were adopted in both agriculture and industry.

Agricultural output appears to have been very poor in spite of intensive compulsory labour, due partly to inappropriate irrigation techniques for rice and partly to the lack of attention to other crops such as fruit. The fish catch also appears to have been sharply reduced. In some manufacturing industries, on the other hand, the quantity of output may have been greater than in the 1960s. This appears to have applied particularly to boat building, agricultural hand tools and other engineering activities, but no data are available to estimate its extent. In any event, few such achievements could be sustained without the labour conditions which existed under the Khmer Rouge regime.

While no foreign trade statistics are available for the 1975-78 period, the country seems to have been less self sufficient than was implied by Khmer Rouge policy. In the absence of money, all trade was conducted on a barter basis, the main trading partners being China, the Democratic Republic of (North) Korea, Yugoslavia, Madagascar and Thailand. In spite of domestic food shortages, exports included coconuts, dried fish and rice, as well as crepe rubber and wood, while imports included cotton, armaments, oil, machinery and spare parts. No credits were accepted, and aid comprised mainly Chinese technicians, who seem to have advised on the construction of infrastructure but only to a small extent on agricultural or industrial production activities.

2. Recent Performance

a. Production

The neglect of many aspects of the economy during 1975-78, necessitated painstaking reconstruction thereafter. As noted above, even those economic performances which did occur could not be sustained under more liberal working conditions, nor following the further population movements and the destruction and looting of buildings and equipment that occurred in 1978/79 as civil war again plagued the country. The Vietnamese military intervention disrupted production, and many workers who had served the Khmer Rouge took refuge in the jungle or abroad.

During the first two years of the new regime, only the groundwork for economic recovery could be laid. The organizational chaos and destruction of industrial plant and physical infrastructure, as well as draught animals and food stocks caused by the departing and/or arriving troops, continuing military resistance in some areas, the absence of economic and social institutions to replace those operating under the previous regime, and the large scale movement of people were among the factors which disrupted rice and other crop planting and brought a halt to much of the rubber and industrial production that had been occurring during 1975-78.

Table I.B.1

SELECTED OUTPUT INDICES AND QUANTITIES, 1979-86

	1979	1980	1981	1982	1983	1984	1985	1986
Indices of agricultural output (1979-81=100)	83	113	104	117	139	154	167	165
Food, total	82	113	104	118	138	154	166	163
per capita	82	115	103	113	130	140	147	142
Cereals, total	70	130	99	117	148	173	185	176
per capita	70	132	98	112	138	157	164	152
Area under eight main crops ('000 ha)	987	1524	1520	1775	1860	1811	1865	1814
Rice	853	1356	1350	1680	1755	1700	1750	1700
Maize	75	99	95	30	35	33	33	31
Cassava	22	25	25	10	10	13	15	15
Beans	20	28	33	37	38	40	40	41
Sesame	7	8	9	10	10	12	13	13
Groundnuts	6	5	5	5	8	9	10	10
Main crop output ('000 mt)								
Rice	850	1470	1160	1400	1700	1970	2100	2000
Maize	70	100	98	46	80	90	92	92
Cassava	143	150	145	61	90	95	100	100
Dry beans	12	17	23	26	29	30	35	37
Sweet potato	14	15	14	17	25	30	33	34
Livestock population ('000)								
Cattle	739	798	956	1040	1247	1466	1500	1571
Buffalo	350	404	404	406	510	600	685	705
Pigs	132	222	260	487	777	1008	1200	1299
Poultry	4800	4400	6000	6000	6000	8000	9000	9000
Fish catch ('000 mt)								
Total	30	52	69	59	64	65	68	70
Inland waters	22	45	63	53	59	60	62	63
Marine	8	7	6	6	5	6	6	7
Unrefined salt ('000 mt)	26	30	24	38	40	40	40	40
Beef and pork ('000 mt)	22	26	29	35	39	42	48	n.a.
Ministry of Industry-owned manufacturing units' output indices (1979 = 100)	100	152	104	98	166	143	149	133

Sources: UN Economic and Social Commission for Asia and the Pacific (ESCAP), Statistical Yearbook for Asia and the Pacific, Bangkok, 1988; and Ministry of Industry, Phnom Penh (for manufacturing indices).

To avert the threatened famine, humanitarian aid from abroad largely substituted for normal economic activity in 1979-80. A major contribution by the UN system at that time enabled the country to take the first steps towards rehabilitation, which is documented in

Chapter VI.B below. Among other activities, it assisted the revival of food production and the partial restoration of ports and roads.

Since then, the 1980s have seen recoveries in all sectors of the economy, albeit working from very low bases in most cases, as the statistics presented in Table I.B.1 indicate. Even in 1980, 1.35 million ha were put under rice cultivation compared with only 0.85 million the year before, and output rose from 0.85 to 1.47 million tonnes. A similarly sharp recovery occurred in those manufacturing units which could be recommissioned quickly under the auspices of the Ministry of Industry: their 1980 output was 52 percent above that of 1979. Some achievements were short-lived: in the 1980/81 season, drought and flooding reduced rice production and continued the country's dependence on food aid, and output fell in some factories as inherited stocks of raw materials were consumed. Otherwise, however, reasonable rates of growth in agricultural and industrial output and dramatic increases in commercial activity have been achieved throughout the 1980s. The most impressive agricultural improvements occurred in 1983 and 1984, when cereal production rose by 26.5 percent and 17 percent respectively.

Nevertheless these gains (discussed in detail in Chapters II and III) represent only first steps in the resurrection and development of the national economy. Per capita GNP was estimated to be below $US100 in 1984, a drastic decline in real terms from its 1969 level and although it may have recovered to about $US160 by 1987 this would still leave Cambodia one of the world's poorest countries.[8]

b. International trade

Official trade statistics are not yet available in comprehensive form, but the volume of exports is reported to have grown tenfold between 1979 and 1988, when the Ministry of Planning has reported their value to have been $US35.5 million. This was 30 percent higher than the year before, due largely to the very large volume increases for timber, red corn and sesame seed shown in Table I.B.2. Apart from car tyres and paper, the main items have remained agricultural -- notably rubber, timber, soya beans and corn, but not yet rice. The actual value could be perhaps 50 percent higher if informal exports in gems, fish and perhaps timber could be taken into account. As most official trade has been conducted under economic cooperation agreements up to now, most exports have been to socialist countries, the principal destinations being the USSR, Viet Nam, Hungary and the German Democratic Republic. The USSR, which has accounted for just over 11 million rubles in each of 1987 and 1988, takes mainly high-grade rubber latex.[9] Markets are now being diversified for recorded sales, however, as a result of improved shipping contact with Singapore and several recent agreements with Thai entities following Hun Sen's visit to Bangkok in January 1989. In the previous year one foreign trader, who provided goods worth $20 million from a dozen non-Socialist countries to the Phnom Penh authorities and NGOs, took in exchange $5 million worth of rubber as well as quantities of soya, mung bean and high-value fragrant wood.

The previous regime's policy of refusing credits and aid was halted, and imports have risen much faster than exports since 1979. The Ministry of Planning in Phnom Penh has computed the total value of recorded imports to have been $US130 million in 1988, 7 percent above the year before's $121 million. Somewhat higher values for both years are suggested by the trade data of the source countries. The main imported items are food, cloth, chemical fertilizers, vehicles, tractors, cement, fuel, raw materials such as cotton, and spare parts. Principal commercial sources have been the USSR (Rb117 million in 1988, mainly for machinery and oil), Viet Nam and other socialist countries. Increasingly, however, and mainly through private intermediaries, the country's sources of supply have been widened to Thailand, Singapore, Japan and a dozen other non-socialist countries, as well as China whose agricultural tools are favoured by Khmer farmers. In addition, a significant volume of goods are imported under assistance programmes of the socialist countries and western-based humanitarian agencies. Around two-thirds of the USSR's 1986-90 average annual aid of Rb33 million and perhaps a similar proportion of the agencies' combined 1988 budget of about $30 million may have been represented by imported goods. (This refers to goods delivered in the country, i.e. excluding aid to displaced persons at the Thai border.)

Formally, all commercial and humanitarian imports are subject to State license, but in practice there is a large volume of commercial imports -- perhaps amounting to between $100 and 150 million a year -- which appears to avoid this procedure. Many of these imports are basic consumer goods, which used to come across the Thai border, supplied partly from the "land bridge" humanitarian programme, and across the border with Viet Nam. Increasingly, they are reportedly entering by sea -- mainly from Thailand's Trad province to Koh Kong (which can handle vessels up to 500 tonnes), and from Singapore to Kompong Som, which was recently opened to non-naval and non-socialist shipping). Koh Kong trades also with Singapore and Taiwan; its Governor was reported recently as valuing his province's trade with the three countries at the equivalent of $US4 million a month. [10]

The country's official external debt was thought[11] to have risen above US$500 million by 1984 and could be three times that level now.

3. Policies and Plans

a. Changing Ideologies

The Phnom Penh authorities have adopted a pragmatic approach to economic management since they began the task of reconstruction in 1979, notwithstanding the socialist planning goal of the People's Revolutionary Party. Important manifestations of this pragmatism include:

- the restoration of private land operation (and recently ownership) to boost agricultural production,
- the autonomy accorded to provincial authorities and State enterprise managements,
- the delayed introduction of a tax system and its modest levels, and
- the freedom for family, private and joint-venture economies to operate alongside State and collective economies.

Among the opposition groups forming the UN-recognized CGDK, the Khmer Rouge have strongely renounced socialist and communist approaches,[12] and private farming is reported to be permitted in border areas under their DK control. No detailed description of its proposed policy is available, however, and there are

Table I.B.2

EXPORT VOLUMES AND TRADE BALANCE, 1987-88

Volumes of major export items	1987	1988	
Rubber latex	25,019	24,046	tonnes
Timber	24,803	60,303	m^3
Red corn	6,660	18,764	tonnes
Soya beans	6,158	12,166	tonnes
Sesame	535	3,500	tonnes
Mung beans	727	550	tonnes
Tobacco	621	500	tonnes
Castor oil seed	400	100	tonnes
Pepper	24	79	tonnes
Lacquer	121	350	tonnes
Kapok	433	294	tonnes
Stamps	611,215	580,000	roubles
Tyres	4,000	8,000	pieces

Trade balance with the USSR and all socialist countries (Rb'm)	USSR		All socialist	
	1987	1988	1987	1988
Exports	11.2	13.1	22.6	23.0
Imports	112.0	117.3	113.0	120.0
Balance (export - import)	-100.8	-104.2	-90.5	-97.0

Recorded trade balance with western countries ($US'm)	1987	1988
Exports	4.7	12.0
Imports	8.4	10.0
Balance (export - import)	-3.7	+2.0

Sources: Ministry of Planning; and Table I.B.3 (for USSR data) conflicting reports about how policy is applied in camp administration. With respect to the other two coalition partners, KPNLF and FUNCINPEC, little can be deduced from their activities in the artificial camp economies, but CGDK premier and KPNLF leader Son Sann has issued a memorandum outlining key needs in the reconstruction process.

In his statement, the premier emphasises that *only a system based on a liberal economy is really suitable for the local socio-economic conditions ... [a system] that will benefit the people and not a group opf intermediaries. It will definitely be a system that will help people build up assets and not accumulate debts from year to year.*

Table I.B.3

TRADE WITH THE USSR, 1980-87 AND 1988

(million roubles)

Product group	1980-82	1983	1984	1985	1986	1987
FROM USSR TO PRK						
150 Chem. ind. equip.	--	0.5	3.1	2.0	1.0	1.5
154 Road equip. & mach.	--	--	0.5	1.5	1.5	2.9
166 Irrigation equip.	2.5	1.0	2.0	0.3	0.2	4.3
191 Lorries & tnspt	3.8	7.9	7.4	9.6	13.2	9.6
-- Other mach. & equip.	34.1	16.8	14.9	20.1	33.6	26.2
10-19 Subtotal	40.4	26.2	27.9	33.5	49.5	44.5
22 Oil & oil products	28.6	21.4	27.4	29.5	30.3	29.0
514,907 Yarn	5.3	4.5	4.5	4.7	9.3	9.2
900 Cotton fabrics	3.3	2.0	3.2	3.5	4.5	5.1
Flour	14.8	--	--	--	--	--
96 Medicine	--	--	1.2	2.2	2.4	1.9
-- Other items	22.3	13.7	12.0	17.7	18.0	22.3
TOTAL IMPORTS FROM USSR	114.7	67.8	76.2	91.1	114.0	112.0
Total for 1988						117.3
Total for 1980-88						693.1
FROM PRK TO USSR						
Rubber latex	5.8	4.0	5.2	8.5	8.2	10.8
Other items	--	--	--	0.6	0.5	0.4
TOTAL EXPORTS TO USSR	5.8	4.0	5.2	9.1	8.7	11.2
Total for 1988						11.7
Total for 1980-88						55.7

Sources: USSR, Foreign Trade Statistics, 1987, June 1988; and Journal of Foreign Trade Statistics, March 1989.

In the same statement, he makes a strong plea for major economic assistance *made in a spirit of mutual aid and peaceful coexistence, even a kind of Marshall Plan for the reconstruction not only of Cambodia but also for all the neighbouring countries ... particularly Viet Nam and Laos.*

b. Five year programme

Meanwhile the economy within the country is operating under the guidance of the Five Year Programme covering 1986-90, which was adopted at the Fifth Party Congress in Phnom Penh in 1985 and ratified by the National Assembly. The Programme sets out the following six development objectives, some of which may need to be modified in the light of more recent decisions to promote private enterprise in production and trade and give less emphasis to collectives:[13]

(a) To increase agricultural production through development of the four "spearhead branches" of the economy (food, rubber, timber, and marine products). Targets include annual production of 3 million tonnes of paddy rice on 2.5 million ha of cultivated land; 200,000 m³ of timber, and 130,000 tonnes of fish by 1990. Rubber production is to be expanded by 1990 to 50,000 hectares of rubber plantations with a yearly output of 50,000 tonnes of latex or crepe rubber. The agricultural sector must ensure enough food and foodstuffs for the whole society, provide farm products for export, and part of the raw materials for industrial and handicraft production.

(b) To restore in a selective way the country's industrial capacity through the development of the country's hydro-electric potential, the rehabilitation and expansion of factories using only domestic raw materials (timber, cigarettes, bran oil, sugar, soap, jute bags, paper, rubber products), the creation of new factories (phosphate, plywood, matches, glass, bricks, cement), and the development of new medium- and small-scale industrial enterprises. The rehabilitation and expansion of the country's transportation and communications system also is to be given emphasis.

(c) To expand the range and volume of exports, largely through

bilateral economic cooperation programmes.

(d) To consolidate and strengthen State purchase, distribution, reception, and control of the chief products (food, rubber, main farm products, industrial goods produced by State-owned factories, imported commodities). To consolidate the relationship between the State and the peasants according to the slogan selling rice to the State is a patriotic act and selling goods to the peasants is a manifestation of the State's responsibility toward the people.

(e) To concentrate capital investment in the spearhead branches of the economy, especially the restoration of hydraulic works, communication and transport, and rubber exploitation, as well as in essential enterprises which will constitute the material base for construction, trading and banking activities. Capital construction is to be directed to the key branches of the economy and key localities and projects, as well as to projects involving joint participation by the central and local levels, such as hydraulic works, roads, schools, and public health facilities; and

(f) To improve economic management by building up cadres of managers and skilled workers.

The Programme also outlined the coverage of the State, collective, family and private economies, to which a fifth, joint ventures, has been added this year reflecting the progressive liberalization of economic policy:

The State economy includes production and trading enterprises owned by either central or local governments.

- The collective economy comprises small solidarity production groups (*krom samakki*) in farming, fishing, small industry, handicraft, forestry, transport and construction.

- The family economy comprises the extra income earning activities of collective members and office workers.

- The private economy, officially recognized since 1985, is intended to create jobs, yield tax revenue and produce goods and services in such sectors as small industry, handicraft, civil construction, fishing, trading and transport. Level-three *krom samakki*, which now account for most of the agricultural groups with this title, are more private than collective in the way they operate.

- The new joint venture category appears to be partly a means of partial privatization of State enterprises and partly associated with the recent policy to encourage foreign investment. Reported statements by senior Phnom Penh officials have indicated that the forthcoming investment law may not in fact restrict foreign capital to joint ventures with the State, but even permit 100 percent foreign ownership in some types of activity. It is also likely to offer tax holidays and guarantee right of repatriation.

Policies on the organization of economic enterprise in primary production activities and in industry are discussed further in Chapter V.E below. It can be noted here, however, that the liberal approach has been applied most quickly in the services sector, especially domestic and to some extent foreign commerce, although apparently not so far in financial services. It is reported by Phnom Penh residents that the former State market in the city has been privatized and operates along with four other large and many small free markets. The lesser urban centres also have free markets. In a related recent development, State employees no longer receive part of their income in kind from State stores. The gradual withdrawal of the State from trading activities is reflected also in the changes now occurring in the *krom samakki* system: with private farming there may no longer be a framework for the State to buy produce and to supply agricultural inputs, opening the way for private rural trading systems to emerge.

c. Foreign trade policy

Import licensing, at least for commercial imports, is intended to ensure that the country's scarce foreign exchange is directed towards essential goods not produced in the country. Some luxury goods are permitted, however, presumably for resale to tourists, diplomats and others with hard currency who appreciate the absence of import duties, even on items such as cars, liquor and electronic equipment.

A large amount of the unrecorded trade does not appear to be treated as illegal. And some of it appears to be taxed at the port of entry, with at least part of the revenue accruing to the State. Moreover, some imports and exports may have been made more official by the recent announcement that the provinces of Koh Kong and Kampot are authorized to undertake foreign trade without reference to

Phnom Penh (in the same way that provinces trade autonomously among themselves).

d. Financial Institutions

The re-establishment of a financial economy commenced in 1979 when free markets for goods began operating internally and at the Vietnam and Thailand borders, using dong, baht, rice (in which State employees were paid) and dishoarded gold in lieu of a domestic currency. March 1980 saw the introduction of a new riel (initially valued at $US0.25 or 1kg of milled rice), and reactivation of the central bank (BNC, also known as Chamcar Mon).

Subsequently, the Government established a bank for external commerce (BCEC) and more than 30 BNC branches. The BCEC is said to handle inward and outward transfers quite efficiently, especially since it now has 23 correspondent banks abroad. These include the Moscow Narodny Bank (Singapore branch), Banque Nationale de Paris and five other banks in France, Banque Bruxelles Lambert, Deutsche Bank AG, Union de Banques Suisse, Commonwealth Bank of Australia and the Hongkong and Shanghai Banking Corporation.

A notable omission which awaits attention is in the area of rural credit, which could become critical as the State withdraws from the provision of farm inputs. Thus there may be a need to explore the scope for establishing either an agricultural development bank (as considered in the 1960s) or encouraging more rural commercial bank networks. In view of the difficulties which these approaches have experienced in many developing countries, however, there is a clear case for exploring innovative techniques, reflecting the realities of the society. Even in their curtailed form, the *krom samakki* could provide a valid basis for mutualist arrangements.

e. Currency

Since January 1989, the riel has been valued officially at $US0.0067 and is currently (June 1989) valued in the market at $0.0052 (i.e. respectively CR150 and CR193 per $US). In the absence of reliable information on actual trade taxation, it is not possible to calculate effective exchange rates.

C. POPULATION

1. The Background

Prior to the early 1970s, the demographic structure of Kampuchea was typical for a small Asian country. It was predominantly rural, with a customary pyramidical age structure, the numbers of men and women being approximately the same. Natural increase was 2.2 – 2.7 percent per annum. There was a steady, though slow, increase in rural-urban migration, particularly in the more highly populated southern areas.

The catastrophes that befell the country during the 1970s dramatically changed this structure, creating a population structure which is completely different from that of the 1960s. Although adequate data are not available on the present demography of Kampuchea, an attempt is made in this report to assess these changes in relation to the situation prior to the 1970s, and to establish the necessary connections between them and a possible development programme.

A further factor which must be considered is the presence of some 325,000 displaced persons and refugees in the camps along the Thai border, representing some 5 percent of total Kampuchean population. Preliminary studies undertaken in some of the camps indicate that most of these people have come from the two nearby provinces of Battambang and Siem Reap. The needs of these people will have to be considered in the overall reconstruction programme.

2. Assessment of the Total Population

No population census has been undertaken since 1962. There are therefore grave discontinuities in the statistical series, and current estimates of total population are allegedly based on registration counts undertaken at the commune level. A further complicating factor is that the events of the 1970s led to vast movements of people about the country. This in turn served to disturb age-long distribution patterns of population, which are only now beginning to re-establish themselves. Not until a census is undertaken, will there be satisfactory data on the whole range of demographic data. It is therefore recommended that immediate measures be undertaken to hold a census in 1992, a proposal which is included in the project profiles in Chapter VII below.

Within these constraints, present population of Kampuchea is estimated to be about 8.4 million, excluding the border camps. This may be compared with 5,728,771 at the 1962 census, and an estimated 6.82 million in 1970. Population projections by Payet and Migozzi[14] in the late 1960s suggested an annual natural increase of 2.7 percent. This rate of increase would, under certain sets of assumptions, have produced a total population of between 10 and 12 million in 1987. The fact that this population was not achieved has had further consequences for the present structure of the Khmer population.

3. Crude Birth and Death Rates

The Statistics Division of ESCAP has assembled certain estimates concerning population increase/decrease in Kampuchea for the decade commencing 1977[15]. According to these estimates, there was a steady decline in population numbers until 1980, when the total was estimated to be 6.4 million. Annual decreases of 2.3 - 2.8 percent were experienced during the latter 1970s. By 1982, however this trend had been reversed, and reached a peak in 1983/84, when annual rates of natural increase in excess of 3 percent were estimated. The crude birth rate is currently estimated to be 41.8 per thousand population, and crude death rate to be 16.9, giving an increase of about 2.5 percent per year. Although these figures should be treated with some caution, they do appear to confirm the point brought out later, that there was a sudden increase in reproduction in these years.

Table I.C.1

COMPARISON OF THE KAMPUCHEAN POPULATION STRUCTURE, 1962 AND 1987 (ESTIMATED)

Age Group	1962 No.	%	1987 No.	%
0 - 4	855 440	14.93	1,600,000	20.5
5 -14	1,654,175	28.87	1,900,000	24.4
15 +	3,219,156	56.20	4,300,000	55.1
Total	5,728,771	100.00	7,800,000	100.00

Sources: 1962 Census: Annuaire Statistique 1970, Institut National de la Statistique et des Recherches Economiques, Republique Khmere; Estimates in UNICEF, op. cit.

According to the same source, life expectancy has similarly risen from a low of 30.0 years for males and 32.5 years for females in 1980 to the present figures of 46.5 and 49.4 respectively. Although this is still low for the region as a whole, it certainly indicates a very welcome revival. For infants, the present recorded mortality rate is 133 per 1000. This high figure clearly indicates the need for an intensive campaign in infant and child welfare.

4. Sex and Age Structure

In 1962 the numbers of men and women were almost exactly the same: 2,863,000 males compared to 2,865,800 females. This ratio probably changed very little during the 1960s. By 1980, however, significant changes had occurred as a result of war and famine. Although much of the evidence for this is anecdotal, UNICEF data for certain districts in the five southernmost provinces of Takeo, Kompong Chhnang, Kandal, Kampot and Kompong Speu show a preponderance of females of the order of 54:46. This is less than the figure of 60:40 which is sometimes quoted but it is serious enough. Since no age group data have been provided with these figures, there may well be a much wider variation in the ratio of men to women in the adult population than these figures show.

Indeed, if, from the crude data on age structure quoted in table I.C.1, one assumes that there is sex parity in the 0–15 year age groups, (approximately 45 percent of the population), then the ratio in the higher age-groups becomes 57:43, much nearer to 60:40. This higher figure is borne out by independent studies undertaken by Oxfam in

Prey Veng (1987) and Takeo (1989) provinces.[16] In the part of Takeo surveyed, the proportion of women is indeed as high as 66 percent, though lower figures were more the rule. Moreover, between one in four to one in nine women are widows, and a high proportation of these are household heads, a fact which must clearly influence the future scope of welfare programmes.

These disparities in sex ratio are likely to have grave implications in terms of future programmes dealing with the social and economic needs of a society with a labour force comprised of many more women than men. The implications of these facts are further discussed in the section on women in development, Chapter V.D. below.

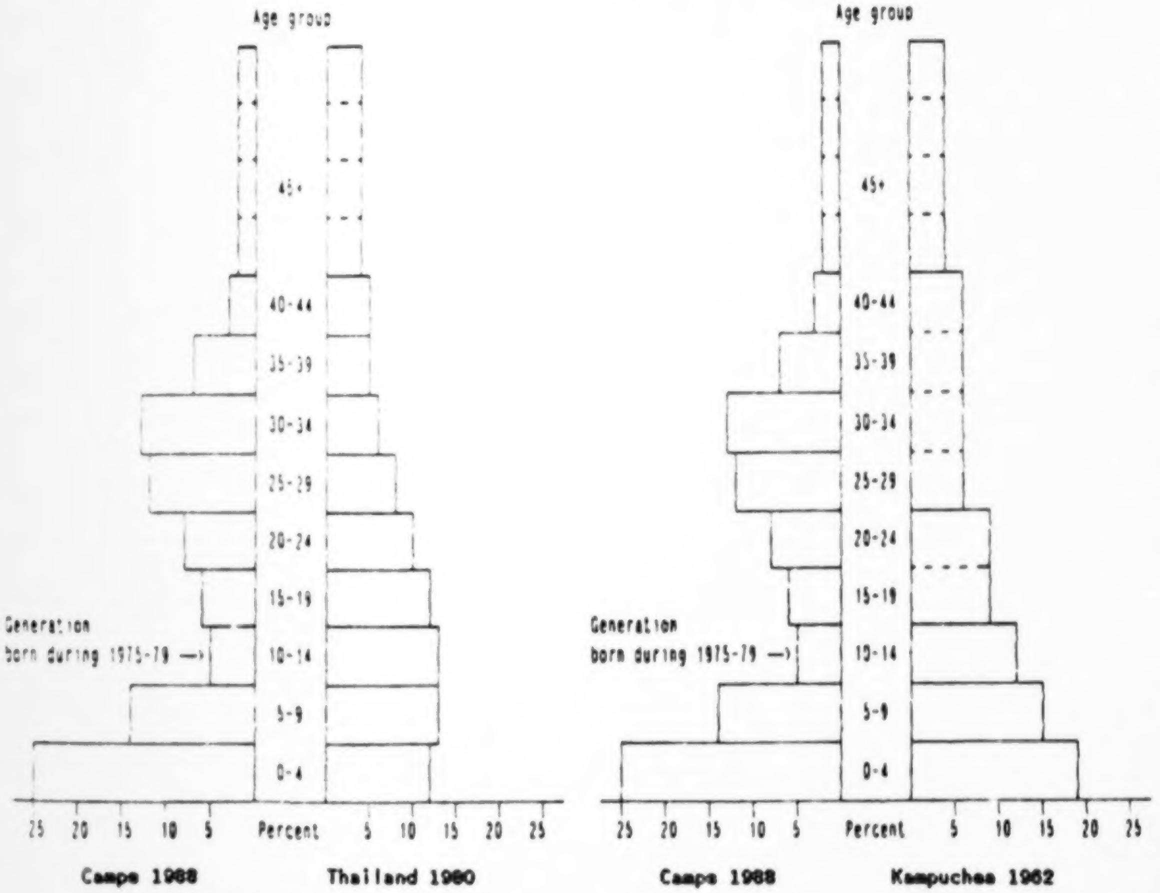
Age structure

Data on the age structure are also extremely sketchy at present. UNICEF data are summarized in Table I.C.1, with comparative figures taken from the 1962 Census.

These figures indicate that the population had roughly the same proportion above and below 15 years of age in 1987 as in 1962. However, beyond this extremely crude

Chart I.C.i

POPULATION PYRAMIDS FOR BORDER CAMP RESIDENTS IN 1988, COMPARED WITH THAILAND (1980) AND KAMPUCHEA (1962)



Source: Annual report of the UN Border Relief Operation for 1988, page 2.

comparison, considerable differences are likely to exist. For example, there was a far higher proportion of children in the 0-4 age group in 1987 than in 1962, thus confirming that a sudden increase in birth rate took place in the early 1980s, with implications for health and education programmes. Furthermore, if the 15+ age group could be broken down, potentially important variations in proportions in the later age cohorts would be revealed.

Although information on this latter phenomenon is not available in Kampuchea itself, data from the border camps, which are summarised in the population pyramids in Chart I.C.I, clearly demonstrate the catastrophic effect of the events of 1970-1979 upon the age structure of the population there.

These statistics show the extent to which the age structure over the vital middle years of 14-29 were depleted by war, famine and execution; whether such a pattern is typical for the country as a whole, is not known. But if it is, it will certainly exert profound influence over development policy for the next 10-15 years.

Furthermore, as already noted above, there are likely to be significantly more women than men in these later age groups -- a fact which has grave social and economic implications (discussed in Chapter V.D below).

5. Provincial and Urban Distribution

Table I.C.2 has been compiled showing trends in provincial populations at selected dates during the past 26 years. This shows that increases have taken place in all provinces but Kompong Chhnang (a phenomenon which is largely unexplained), as the land was once more settled after the Khmer Rouge movements.

Trends in four broad regions of Kampuchea are shown in Table I.C.3, which divides the country into four groups of provinces, the area

Table I.C.2

PROVINCIAL POPULATION TRENDS AND LOCAL GOVERNMENT AREAS

Province	Area (km^2)	Population ('000) 1962	Population ('000) 1981	Population ('000) 1986	1962/86 Increase (1962=100)	Number of Local Gov't Areas, 1987 Distr.	Number of Local Gov't Areas, 1987 Comm.	Number of Local Gov't Areas, 1987 Vill.
Kompong Cham	10,498	821	1,070	1,266	154	15	164	1,640
Kandal	3,813	706	720	742	105	11	149	1,094
Battambang (a)	19.044	551	719	789	143	13	108	967
Prey Veng	4,883	487	672	779	160	12	115	1,102
Takeo	3,818	465	531	574	123	10	97	1,102
Phnom Penh	46	394	329	561	142	7	74	221
Siem Reap (b)	10,897	313	477	541	172	12	101	935
Kompong Thom	12,251	320	379	426	133	7	77	702
Kampot	9,862	340	354	408	120	8	95	666
Kompong Speu	7,016	307	340	394	128	8	87	1,263
Svay Rieng	2,966	289	292	354	122	7	80	1,277
Kompong Chhnang	5,520	274	221	254	93	7	66	535
Pursat	12,692	180	175	213	118	5	37	383
Kratie	11,094	126	167	179	142	5	22	77
Preah Vihear	14,350	..	70	82	..	7	48	192
Kompong Som	69	7	53	66	843	2	21	78
Ratanakiri	10,782	49	45	53	108	6	43	244
Stung Treng	11,209	35	39	47	134	5	34	122
Koh Kong	11,140	39	25	39	100	7	30	114
Mondulkiri	14,288	15	16	19	121	5	44	221
TOTALS	181,916	5,729	6,684	7,787	136	159	1,492	12,960

Notes: (a) Battambang has now been subdivided into two provinces, Battambang & Banteay Meanchey; (b) Siep Reap has been subdivided into Siem Reap & Oddar Meanchey.
Sources: 1962 Census; 1981, Report of Finnish study, op. cit. page 31; 1986, Ministry of Planning

of each group being approximately the same. However, the population density of the four is very different. About 70 percent of the people live in the eleven provinces (including Phnom Penh itself) in the Centre and South regions where population densities are much higher than in the remainder of the country. Although some resettlement has taken place in the south, to reclaim lands that have been lying unused since the early 1970s, most of the potential for land reclamation is in the remaining parts of the country, particularly in Battambang.

Table I.C.3

DISTRIBUTION AND DENSITIES OF POPULATION WITHIN BROAD REGIONS OF KAMPUCHEA, 1962 CENSUS AND 1986 ESTIMATES

Region	Area (km$_2$)	1962			1986		
		Total Popn ('000)	%	Density	Total Popn ('000)	%	Density
West and Northwest	43,107	773.5	13	18	1.041	13	35
North	44.058	633.4	11	14	967	12	23
North and Northeast	47.258	224.7	4	5	298	4	6
Centre and South	43.614	4,108.5	72	94	5,481	70	124
Totals	181,614	5,740.1	100	32	7,787	100	43

Note: The regions are as follows:
West and Northwest: Battambang, Banteng Meanchey, Pursat, Koh Kong;
North : Siem Reap, Oddar Meanchey, Kompong Thom;
North & Northeast : Stung Treng, Ratanakiri, Mondulkiri, Kratie;
Centre and South : Remainder of the provinces.
Sources: 1962 Census Analysis; 1986 Estimates.

Table I.C.4

POPULATION OF IMPORTANT CITIES IN KAMPUCHEA, 1962-1987

City	1962(a)	1968(b)	1974/75(c)	1987
Phnom Penh	393,995	550,000	1.2-2.0 mil.	564,000
Kompong Som	7,095	14,000	40-60,000	16,000
Battambang	38,780	42,500	60-100,000	45,000
Kompong Cham	28,532	30,500	50-60,000	33,000
Pursat	12,115	16,000	50-60,000	16,000
Kompong Chhnang	13,001	14,000	50-60,000	15,000
Kampot	12,700	14,000	50-60,000	15,000
Kratie	12,139	13,000	50-60,000	14,000
Svay Rieng	11,317	12,500	25-30,000	14,000
Siem Reap	10,281	11,000	25-30,000	13,000
Kompong Thom	9,477	10,500	20-25,000	12,000
Prey Veng	8,847	10,000	20-25,000	11,000
Kompong Speu	7,334	10,000	20-25,000	n.a.

Sources: (a) Census figures as quoted in Mekong Committee, Handbook of Statistics and the Atlas of Physical, Economic and Social Indicators of the Mekong, 1970; (b) Area Handbook for Cambodia, US Government Pamphlet DAPAM 550- 50, October 1968, page 33;
(c) estimates by UNICEF in 1975, including refugee populations.

Perhaps the most remarkable inference to be drawn from this is that, in spite of the enormous upheavals of the 1970s when large forced migrations took place, population distribution has remained largely unchanged from the early 1960s. This is, of course, dictated by the geography of the country, with most people living in the comparatively more fertile Mekong plains.

Some attempts were made before the 1970s to resettle people from the south into sparsely populated areas where, it was considered, there was a potential for agriculture. Some 6,000 families were resettled under this scheme. But there is no record of its success (or failure).

During the Democratic Kampuchea period of the late 1970s, quite massive movements of people took place. These have been documented in the above-mentioned Finnish study, from which the accompanying maps are reproduced in Chart I.C.ii. Although these early movements were mainly the result of the evacuation of cities, the later ones were not confined to this, and involved inter-provincial movements of a more widespread nature.

The movement of people about the countryside in the 1980s has taken two forms: the first, by individuals to return to their place of origin, the second on a more organized basis to reclaim land which was left vacant in the aftermath of the 1970s. The first is, to some extent, still going on, though to a lesser extent than in the early 1980s. The reclamation of vacant land within provinces has been undertaken over the past ten years. This is an important initiative founded on the necessity of bringing back into cultivation those areas that were vacated during the 1970s. It is further discussed in Chapter II.B below.

This population distribution is likely to be further altered by the influx of people from the border, currently estimated at 307,765 (under UNBRO assistance) and 17,634 (under UNHCR). A recent study in two camps appears to bear out the generally held view that most of the border population are from Battambang Province (50 percent), followed by Siem Reap (12 percent) and Kandal (7 percent).

If this holds true in all the camps (a hypothesis which, would have to be confirmed by the more general surveys currently being planned), the result would be to reintroduce some 100,000 -150,000 people into Battambang Province, thereby raising its present population from about 840,000 to nearly 1 million. Similarly, an increase of up to 40,000 might be expected in Siem Reap province, whose population is at present about 550,000. From evidence compiled from preliminary surveys of the intentions of border populations, it appears that the greater part of these people would prefer to be resettled in the countryside. This whole matter is discussed further in Chapter VI below.

The Urban Population

Only an estimated 12 percent of Kampuchea's population lives in towns and cities. Because of the poor state of urban infrastructure, which was neglected during the late 1970s and has had little spent on it since, the current regime has sought to discourage the flow of people from rural areas. The basic infrastructure of important cities, particularly the Phnom Penh municipality, will have to be rehabilitated, and this matter is discussed in Chapter IV.D below.

In 1962, 89.5 percent of Cambodia's population was rural, and of the urban population, two-thirds lived in Phnom Penh itself. Only 15 percent of this urban population lived in towns outside the more densely populated provinces of the centre and south. By the end of the decade, Prud'homme had estimated that the urban population had risen to over 12 percent, indicating a slow drift to the towns. Compared to neighbouring countries, this rural/urban flow was modest indeed. By the beginning of the 1970s, Kampuchea was still a predominantly rural country, and remains so today.

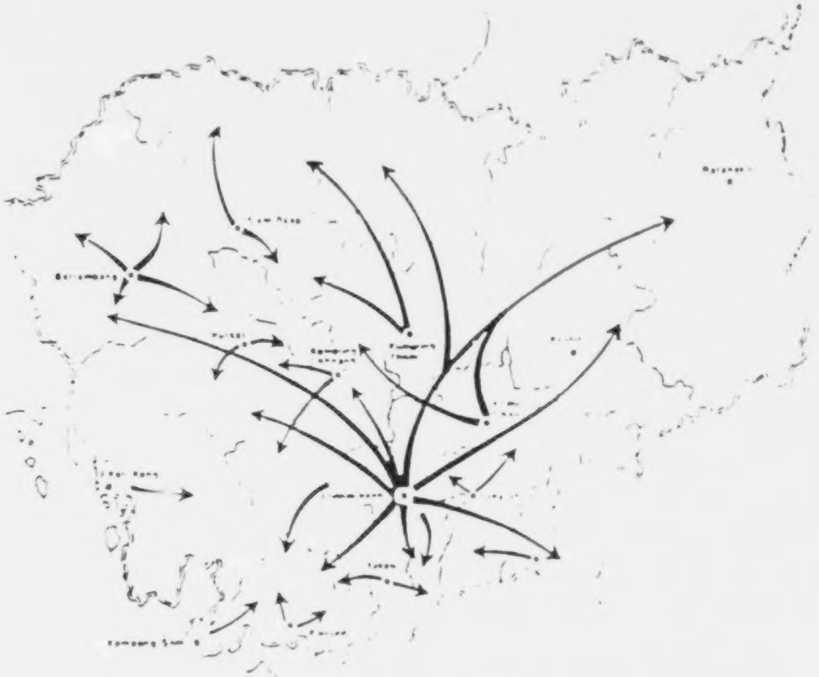
Population trends in the urban areas of Kampuchea are shown in Table I.C.4, which assembles the known information on this subject over the past two to three decades. It shows that in 1962 Phnom Penh had already attained a high degree of "primacy" over the other towns of the country, and this continues into the present decade. The story of the 1970s has often been told: of how the warfare in the south and southeast part of the country caused a flood of refugees into the towns and cities, particularly into Phnom Penh itself; and of how these were later evacuated during the Khmer Rouge ascendancy of the later 1970s. The consequences of these movements of people upon the structure of urban development, and upon the fabric of the towns themselves, will be discussed in the Chapter IV.D below.

6. Ethnic Composition

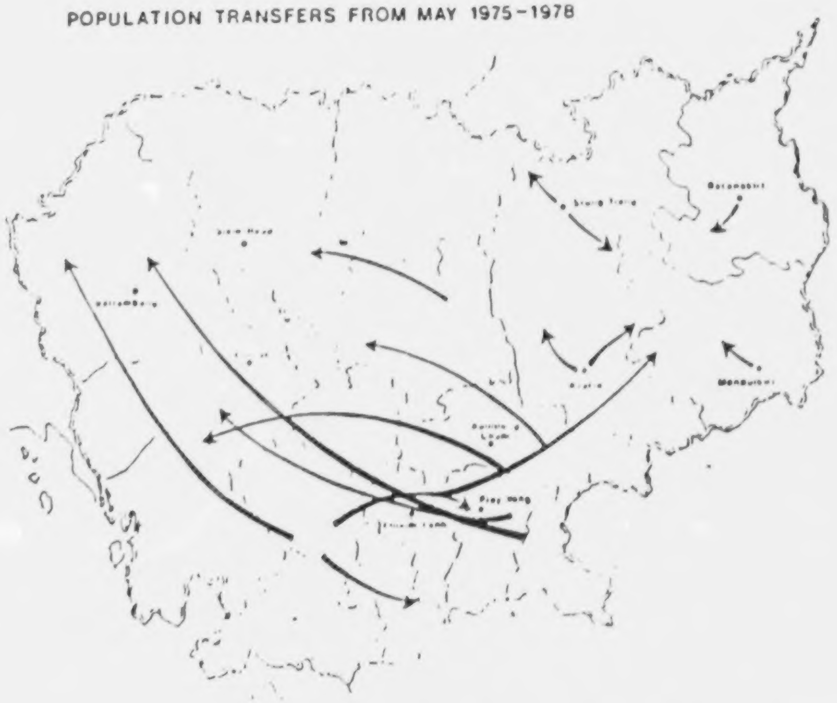
According to the 1962 census, 93 percent of the population of Kampuchea was then Khmer. The next two largest ethnic groups were Vietnamese (3.6 percent) and Chinese (3.2 percent), the former being engaged mainly in fishing and urban pursuits, and the latter being located mainly in the cities. The largest ethnic minority group is composed of Islamic Chams, which in 1962 numbered about 200,000, or about 3.5 percent. By 1981, the percentage of all ethnic minorities had fallen to only 3 percent of the total population, down from 10 percent in

Chart I.C.II

POPULATION TRANSFERS APRIL 1975


Battambang

POPULATION TRANSFERS FROM MAY 1975-1978


Ratanakiri
Stung Treng
Siem Reap
Battambang
Kratie
Mondulkiri
Prey Veng

1962. According to the Finnish study (page 36),

> *The number of Chams fell to under fifty thousand during the Pol Pot period. Today (1981), national minorities account for approximately 3 percent of the population, the largest being the Chinese. Since 1981 some ethnic Vietnamese have returned to Phnom Penh or their former fishing villages on Tonle Sap.*

It is not known what the percentages are at present, but it is assumed that there are still significant numbers of each group. According to the recent UNICEF document cited above, the minority population was 5 percent of the total in 1988, of which half were Chams and other native minorities.

7. The Working Population and Employment

The proportion of working people in the present population is not known. However, at the time of the 1962 census, about 45 percent of the total population was described as working. In 1981, the "active population" was estimated to be 47 percent of the total population, according to the Finnish study (page 33). On the basis of this and other calculations, it has been concluded that the working population must be of the order 3.5 to 3.75 million, rather higher than figures proposed elsewhere.[17]

According to the Employment Statistics compiled under the 1962 census, 80.9 percent of the working population was employed in agriculture. Of the remainder, 7.1 percent was engaged in services of various kinds, 15.9 percent in commerce (chiefly retailing), and only 2.8 percent in manufacturing. Thus only 3.3 percent of the working population found a living in all the other sectors. It is doubtful whether this proportion has changed very much. Indeed, not until a census is held will accurate information be obtained on this.

Notes to Chapter I.A-C

[1] Vickery, Michael, Kampuchea: Politics, Economics and Society, Pinter (London), 1986.

[2] The Front was subsequently renamed as Front for the Construction of the Motherland of Kampuchea, and later as the Solidarity Front for the Construction and Defence of the Motherland.

[3] The PRPK was occasionally known as the Communist Party of Kampuchea, and shared common roots with the quite separate party of the same name which was the formal organization of the Khmer Rouge until they reportedly dissolved it in December 1981.

[4] For a detailed treatment, see Vickery, op. cit.

[5] World Bank: Report of Economic Mission to Cambodia - 1969 (EAP-13a), October 1970.

[6] Kimmo Kiljunen (ed), Kampuchea, Decade of the Genocide, Report of a Finnish Inquiry Commission, 1984.

[7] The 1969-1974 production and trade data were reported in Economist Intelligence Unit, Quarterly Economic Report, Annual Supplement 1975.

[8] Estimate reported in UNICEF, Children and Women in Kampuchea, Situation Analysis, September 1988.

[9] Economist Intelligence Unit, Indochina: Vietnam, Laos, Cambodia - Country Report, No. 1, 1989

[10] Quoted in Bangkok Post, Economic Review, 1989 Mid-year, July 1989.

[11] Estimate in UNICEF, op. cit.

[12] Central Committee of the Communist Party of Kampuchea, Communique concerning the Dissolution of the Communist Party of Kampuchea, December 1981.

[13] Translation arranged by UNICEF, op cit.

[14] Payet, M., Cambodia Assessment Survey, WHO, October 1967; and Migozzi, Jacques, "Les Facteurs de l'Accroissement Demographique," Thesis 1967.

[15] ESCAP, op. cit., page 106.

[16] Boua, Chantou, and Ben Kiernan, Oxfam America's Aid Program in Babong Village, University of Woollongong, NSW, April 1987; and Oxfam in Jakeo, March 1989.

[17] For example, by Curtis in a report in preparation for SIDA (2.5 - 3 million), and by UNICEF, op. cit. (3 million).

II. Resource Development

A. NATURAL RESOURCES

1. The Land its Potential

The country can be divided into two main regions: the mountains, highlands, plateaux and forests that surround the central plain, and the plain itself.

The first region includes the Elephant and Cardamones mountain chains which vary in height from 1,000–1,700 m and which mark the southwest and western areas of Kampuchea. In general, the mountains are densely forested (evergreen, deciduous and coniferous forests) and largely unpopulated. Highlands, plateaux and more mountains occur to the north and northwest along the borders with Thailand, Laos and Viet Nam. These areas are sparsely populated by ethnic minorities who practise slash and burn subsistence agriculture. The Ratakiri plateau and Chhlong highlands possess large reserves of red, fertile soils. Forests cover about 70 percent of the country[1] and could play a more important economic role in the economy of the country by supporting rubber plantations, coffee and commercial timber. Main agricultural activities in such areas at present include the cultivation of limited quantities of upland rice and the gathering of forest products. These activities constitute a large part of the minorities' livelihood.

The second region, the central plain, covers only one third of the country (60,000 sq kms) and yet supports 90 percent of the population and all economic activity. It has four distinct ecosystems,[2] namely the river banks (levees), the lowlands, the upper terraces and the Great Lake plain:

- The levees (*"terre de berge"*) are quite extensive in places. Subsidiary crops such as vegetables, fruit trees, and, in the lower areas, corn, sesame and beans are grown instead of rice. The soil is relatively rich and water supply is rarely a problem due to the high water table. The fields, called "chamcar", are very narrow and elongated and lie perpendicular to the river bank. These areas are usually the most densely populated and often the most valuable, especially if they are close to markets for their produce. Provinces with large areas of this type of ecosystem include Kandal, Kompong Cham and Battambang.

- The lowlands (*"bengs"*) lie between the levees and the terraces. They flood easily, depending on the height of the rivers during the rains. The lower parts of the lowlands are used to grow floating rice, while the higher elevations are planted with rice varieties that flourish in receding waters. The soil is fertile. These areas are less densely populated but normally produce much of the rice that is consumed by the settlements on the levees. They can be found mainly in east Kandal, Kompong Chhang, Prey Veng, western Svay Rieng and south Takeo provinces.

- Mainly rain-fed agriculture is practised on the upper terraces. The soils are often poor, apart from the rich alkaline clays of Battambang. Rice is the main crop. In addition to Battambang, most of Kompong Speu province, north Takeo, west Kandal, west Kompong Chhang and Pursat have this kind of ecosystem.

- The Great Lake plain surrounds the Great Lake and consists of flooded forest and plain. The area has rich soils in which a considerable quantity of floating rice used to be grown in the period prior to the 1970s.

2. Climate

The climate is tropical monsoonal. It is characterised by a short rainy season, a prolonged dry season and irregular occurrence of rainfall both from year to year and within a year.

Most rain falls between May and mid-October and there is often a 10–15 day dry spell (called the "short dry season") that occurs in either July or August. Total average annual rainfall varies greatly from province to province. While the annual rainfall in Phnom Penh and Battambang is 1,375 mm and 1,387 mm respectively, Kompong Speu receives only 1,204 mm and Kompong Som has 3,831 mm. Other examples are Siem Reap 1,442 mm, Svay Rieng 1,805 mm, and Kampot 2,005 mm (see Table IV.A.1). A further discussion on rainfall will be found in Chapter IV.A., Water.

Practically no rain falls during the long dry season between mid-October and May. Ambient temperatures increase from December through to April or May, also as indicated in Table IV.A.1. Cultivation during this period requires either irrigation or access to the receding flood waters.

The fact of irregular rainfall has several consequences. First, if the main rains come late or are irregular, or if there is too long a "short dry season," ploughing becomes difficult or even requires double planting to replace the first crop that has been lost. Second, if the "short dry season" occurs too early it can damage the young rice seedlings or require replanting to take place. Third, the rainy season can end early, affecting rice yields. Conversely, if there is too much rain, early or excessive flooding can also damage or destroy rice nurseries or force the farmers to replant. Finally, although flooding has a general fertilising effect on the soil, if as in 1984 a late first rainfall combines with early flooding, then yields can decline by at least 33 percent.

3. Hydrology[3]

The peak of the rainy season coincides with the melting of winter snows in Tibet. As a result of this double input, the depth of the Mekong river at Phnom Penh increases from about 2.0 m in April/May to 9-11 m from August to October. The volume of flow in the river increases about 28 times from 1,760 m^3 to 53,000 m^3 at peak flood. As the water rises, it begins to flow inland through small rivers and canals ("Prek") into basins and reservoirs ("Beng") and eventually floods the surrounding farmland. According to Delvert, about 2 million ha is flooded every year. Beginning usually in June, the Mekong also reverses the normal flow of the Tonle Sap river for about 110 days each year. During this period, the area of the Great Lake itself roughly quadruples from 270,000 ha to 1 million ha. The Tonle Sap thus acts as a flood regulator for the Mekong Delta. Silt carried down by the river renews soil fertility but it also gradually builds up the level of the land so that it becomes increasingly difficult to irrigate it by gravity. Areas upstream of Phnom Penh receive 10-30 mm of silt per year, the Phnom Penh area receives about 3-9 mm, areas further downstream receive only about 1 mm according to Mekong Committee reports.

Kampuchea has three hydrographic basins: the coastal basin, the basin formed by the Mekong river itself, and the Tonle Sap basin. The coastal basin is fed by the short and turbulent rivers that flow from the Cardamones and Elephant mountains to the sea. For the Mekong itself, some 480 kms of the river's length lies within Kampuchea and the river is navigable year-round up to Kratie. At the "quatre-bars" confluence at Phnom Penh, the river drains the Tonle Sap and divides into two branches, the Mekong stream proper to the east and a distributary called the Bassac. The Tonle Sap basin is fed by the surrounding watershed but mainly by the Mekong in flood. The Tonle Sap is one of the most productive fisheries in the world. The surrounding forest, flooded from June to October/November, is an essential fish feeding and spawning area. Kampuchea's high fish yields are directly related to flooded forest conditions. Kampuchea's hydrologic network is thus very dense and flooding greatly increases the fishing area. Nevertheless, dry season water reserves are very meagre, thus limiting the potential for irrigation.

4. Soils

Soils in Kampuchea can be divided into seven types:

- Red soils (also brown and black) are found mostly on plateaux and in forested areas. They are good agricultural soils, particularly for rubber plantations, but need a vegetative cover.

- Sandy soils are mostly located on the upper terraces, particularly around Siem Reap and the plain west of Phnom Penh. Although they are acid and often poor, they can be easily ploughed. Permeable, their value for rice growing depends on the depth of the clay layer.

- River bank soils are recent alkaline sediments with a silty texture. The best examples are found between Kompong Cham and Phnom Penh. They have excellent physical texture, drain very well, are fertile and can be cultivated year-round.

Clays or clay/loams are found in the lowlands and are of two types.

- Hydromorphic soils (grey, brown), found mostly in the plains round Pursat, Battambang, Kompong Thom, Svay Rieng and Prey Veng are difficult to plough and lack phosphates.

- Battambang clay/loamy soils (yellow, brown) in contrast, are the most fertile in the country. Deep, easy to plough, neutral and fertile, they are excellent for rice, fruit trees, and subsidiary crops.

- Finally, there are flooded and unflooded soils. The former maintain their fertility through siltation, soluble nutrient supply and the neutralisation of soil acidity (Mekong water pH varies between 6.4-8.3). They are mostly weakly acid or neutral clayey loams with good nutrient retention capacity but deficient in nitrogen, phosphorous and especially potassium. The nutrient reserve (NPK) in unflooded soils is lower than in flooded types. Acidity ranges from pH 4.5-6.0 and nitrogen and organic matter are low.

5. Main Potentials and Constraints

Kampuchea has a large forested area that can be used for logging, rubber, coffee, and other plantation crops; extensive areas on the plateaux can be developed for rain-fed cultivation. In fisheries, quite high yields are possible, based on the Tonle Sap and the flooded forest ecosystem. Although this has deteriorated somewhat, the flooded areas can still be developed as extensive fish farms. In irrigation, about 70,000 ha were protected against flooding and 10,000 ha were irrigable. The Prek Thnot and Battambang dams would permit roughly another 150,000 ha to be irrigated and there is scope for small-scale irrigation projects, especially in Prey Vieng. It should be noted, however, that most of this protected irrigated land would receive only complementary irrigation during the rainy season; only a relatively small area could be irrigated during the dry season. In flooded areas, more floating rice could be grown.

The major constraints are: many of the soils are poor or only moderately fertile; furthermore, drought, late first rains, an early end to the rainy season, a variable "short dry season" during the rains and early or excessive flooding are some of the more serious weather-related constraints.

B. AGRICULTURE

1. Farm Systems and Services

a. Pre-1970

Kampuchea was largely a country of smallholders, most of whom owned their land. "New" land was still available on to which farmers could expand. Although there were some large holdings, these did not affect the system of land tenure which in consequence did not suffer from any major problems. Average population density of about 30 per km^2 reflected this situation and showed that, in general, there was no population pressure on the land. Nevertheless, population densities could reach 500 per km^2 in specific areas such as the river banks and on islands in the Mekong, and in the rice growing areas of Takeo and Kompong Speu provinces, densities were as high as 200 per km^2 In such areas, population pressure was apparent and impoverishment could occur although, even here tenant farmers or hired agricultural labour were rare.

In the early 1960s, some privileged groups such as Chinese traders, civil servants, military officers and factory managers were granted title to newly developed or prime land such as that on the red soil plateaux, newly irrigated land, or Battambang's extensive rice fields where mechanized farming was possible. These instances, however, were the exception and essentially there were no tenurial problems.

The traditional system relied on a village trader who was usually either Chinese or Sino-Khmer. The trader lent the farmer all the necessary agricultural inputs and general items and was repaid at harvest time with a portion of the crop. The farmer was usually obliged to sell his crop immediately at harvest time, and consequently at low prices, because he lacked storage facilities. The trader, however, was able to store his share so that the system worked largely to the trader's advantage. In addition to trading profits, the farmer was charged interest on his loans of up to 10 percent per month. The Government attempted to dismantle this system by encouraging villagers to form their own co-operatives which could afford their own storage facilities.

The Office Royal de Co-operatives (OROC) was created in 1956, with the purpose of creating and supporting co-operatives, supplying them with the necessary agricultural inputs, buying crops from farmers at attractive prices, marketing the crops that were bought, and providing short-and-medium term loans to farmers' co-operatives. By 1967, 700 general agricultural co-operatives had been formed throughout the country. This was the most efficient effort since Independence to develop and organize the agricultural sector.

Ministry of Agriculture services were much the same after Independence as during the period of the Protectorate. The Ministry's main objectives were to promote improved seeds and seedlings, and monitor agricultural production through statistical data. The low number of extension workers was not enough to permit effective extension except in the cotton growing areas, and in some OROC-assisted areas of intensive cultivation.

Training. During the 1960s, Agricultural Engineers began to graduate from the Universite Royale des Sciences Agronomiques (URSA) after 4 years of post-secondary school training. Tuition included 6 specializations in agriculture, livestock, forestry, fisheries, irrigation design and rural economics. By 1968, the university had settled in Chamcar-Daung and had the assistance of 10 French faculty members. A faculty of tropical agronomy was set up in Kompong Cham. The Prek Leap "Lycee agricole" located on the banks of the Mekong to the north of Phnom Penh was producing agricultural technicians (*controlleur d'agriculture*) with 3 years of training. Two other similar lycees were planned at Chamcar Krauch in Kompong Cham province and Tuol Sampong near Battambang. At a more general level, agriculture was also taught in secondary schools beginning 1968.

Agronomic research. Two advanced, specialised institutes were operating in Kampuchea in 1968. The Pasteur Institute was producing human and animal vaccines for both Kampuchea and Laos. The IRCC at Chup had a series of research programmes on rubber growing, rubber tree physiology, soils, and rubber technology. The IRCC was considered to be one of the best rubber research institutes in the world.

A soils lab and a phytopathology lab had been set up in Phnom Penh and several different research units covered a variety of specializations. The one at Chamcar Krauch, for example, was investigating the red soils of the plateaux in relation to cotton, fruit tree, jute and subsidiary crop cultivation. Coconut and oil palm problems were being studied at Tuk Sap near Kompong Som. The station at Tuol Samrong was investigating rice and mechanization and there were other pilot stations in Battambang and Prek Thnot. In 1968, the Oceanographic Institute was under construction in Kompong Som with French assistance.

b. 1970–75

In the early 1970s, the massive bombing east of the Mekong had the effect of forcing thousands of peasants to flee their farms either because their homes had been destroyed or their draft animals had been killed. At the same time, other farmers were fleeing from the increasingly large portion of the country which was controlled by the Khmer Rouge, to escape agricultural collectivisation. The bombing also seriously damaged the communications network of the country.

By contrast, the Battambang region was relatively quiet and continued to play the role of major supplier of rice and food to the country. A constant airlift (Kampuchea at this time had 14 to 17 air companies) was maintained from Battambang to Phnom Penh. The Ministry of Agriculture still continued its activities through its extension services in Takeo, Kompong Speu, and Kandal. Phrek Thnot research station, with assistance from Israeli technicians, was still operating in 1972/73. By this time however, the Khmer Rouge had gained control over much of the countryside, imposing their organisation on the rural society.

In the non-Khmer Rouge areas, inefficient technical services worsened the situation. The urban areas depended on American rice sent as food aid. Soaring inflation meant that one kilo of rice rose from 18 riels in 1970 to 340 riels in 1975 while civil servants' salaries remained substantially the same. There was still a large international community including FAO, UNDP, ILO, WHO and bilateral donors (mostly French, European and Japanese).

It is probable that all the production statistics referring to this period are not reliable. The monitoring system was in place but total disorganization and the extent of the uncontrolled area made any realistic appraisal of the existing situation difficult. The mission was therefore unable to evaluate this.

c. 1975–78

The Khmer Rouge inherited a country in a state of social and economic collapse. However, their own efforts left the country in an even worse state. The population of Phnom Penh was evacuated and dispersed to collective farms, the aim being to base all farming on a huge human task force, while draft animals were used for transportation. The cattle were herded together, and there was no disease control; so that rinderpest, which had been totally eradicated in the 1960's, now returned and even threatened to spread into Thailand. Aphtous fever and anthrax also re-appeared. A vast irrigation programme was also undertaken, creating the so-called "Pol Pot canals", many of which were incorrectly sited and simply unusable. Large scale clearing of forest land took place, and these areas were cultivated.

However, a network of repair workshops was established throughout the country, and spare parts were manufactured. There were allegedly 10,000 Chinese specialists in the country at that time, presumably advising on many aspects of these undertakings. No currency was used, and there were no markets. The people were provisioned with food and clothing by the authorities.

d. The past 10 years

During the 1970s, an estimated 1 to 2 million persons died or were killed, resulting in a drastic reduction of labour force in the rural sector. There was also a drastic reduction in draft animals (see Chapter II.C. below) about half the herds disappeared. As draft animals are universally used for cultivation, this reduction of their numbers caused a marked reduction in cultivated land.

Traditional rural society was completely overturned and so was the family unit. Also, most of the population was living far from their original villages. The country was short of qualified technicians. As the Khmer Rouge fled the Vietnamese military intervention, there was much destruction of infrastructure, the crops, the wells, etc. With no seed available to grow rice and subsidiary crops, the population was stricken with famine. All technical archives and books had been destroyed. During the period, much forest land was cleared, especially the flooded forests surrounding Tonle Sap. Shifting cultivation became more widespread. Security problems persisted in several provinces resulting in large areas of abandoned land especially around Battambang. Tractors had also been destroyed.

The list could be continued. But here are some revealing data:

	In Late 1960s	In 1979
Numbers of cattle and buffalo	3,000,000	1,500,000
Cultivated land (ha)	2,800,000	770,000
Rice production (tonnes)	2,500,000	565,000

The manner in which farmers managed to resettle their lands in 1979-81 remains largely unknown. When they returned to their villages, the farmers faced major difficulties: their houses had often been destroyed; there were no more individually-owned cattle; the former arrangement of fields had been regrouped into large and geometrically shaped pieces of land; and some 20 percent of the population were widows.

The answer of the Phnom Penh authorities to these problems was to organize the farmers into solidarity groups (*krom samakki*), a system of co-operative farming which made common use of the available equipment and supplies, and produced their output collectively. The authorities set up three levels of solidarity group, ranging from the most collective to the most liberal. The characteristics of each level may be summarised as:

Level 1
Pure system of co-operative farming
No private production
All inputs, equipment and outputs owned/handled by the group

Level 2
Intermediate system
A common plot in addition to individual plots
All inputs provided through the group
Production is sold individually

Level 3
Private enterprise
All inputs are obtained privately
Production is sold privately

Krom samakki members at Level 3 are effectively individual farmers, the group being used only to collect production data, for relations with the administration or for voluntary group activities, for example to rent a truck for market. In 1981, 22 percent of farmers belonged to Level 1, 57 percent to Level 2, and 21 percent to Level 3. For a detailed explanation on the krom samakki, see Chapter V.D below.

Rice production during this period had reached 60-68 percent of 1960s average production. The 1981 draft animal herd was estimated at 50-60 percent of the 1970 figure. The inputs from NGOs contributed greatly to this recovery. Despite a severe lack of skilled technicians, the Ministry of Agriculture was rebuilt.

e. External Assistance

Socialist countries had supplied food in the early 1980s to overcome shortages. They have also provided assistance in the form of tractors, trucks, fuel, cement, pumps and spare parts, as well as technical assistance for rubber plantations and for cotton development. The extent of this assistance is not known, and may well be substantial.

NGO assistance has played a critical part in the recovery of Kampuchea. Although sometimes uncoordinated, the NGOs achievement has covered most of the agricultural sub-sectors (including irrigation works), supply of agricultural inputs and equipment, supply of technical books, creation of a soil laboratory, advanced training, setting up of an applied research station, cattle vaccine laboratories, veterinary supplies, veterinary diagnostic laboratories, reforestation, piggery production centre, draft cattle breeding centre, support for Prek Leap agricultural college, etc. A more detailed list of activities according to sector is given in the Annex to Chapter VI below. NGO activity is very well suited to specific small-to medium-scale projects.

FAO provided assistance during the emergency phase between 1979-82. This consisted of the supply of fertilizers, agricultural inputs, spare parts for tractors and pumps, nylon for fishing nets, training and experts for pump repairs, and in immunization systems for animals.

2. Rice

a. Traditional system

Rice is by far the most important staple food in Kampuchea. About 2.5 million ha of paddy were under cultivation in the 1960s, accounting for 83.5 percent of cultivated area. About 81 percent of farmers (65 percent of the economically active population) grew rice. As Table II.B.1 shows, annual paddy production was about 2.5 million metric tonnes and rice exports generated the most foreign exchange. In 1963, Battambang province produced a record 700,000 tonnes from 470,000 ha. The most productive provinces, in descending order, were Battambang, Prey Veng, Siem Reap, Takeo, Kompong Cham, Svay Rieng, Kampot and Kompong Thom (see Table II.B.2). And yet national average yield was only about 1.0 tonne per ha, one of the lowest in the world.

Table II.B.1

PADDY OUTPUT AND EXPORTS, 1960-1968

Year	Area (ha)	Output (m/tonne)	Rice Export
1950	1,657	1,576	46
1951	1,682	1,651	113
1952	1,687	1,677	169
1953	1,629	1,627	141
1954	1,693	1,733	293
1955	1,743	1,488	101
1956	1,837	1,789	71
1957	1,937	1,986	231
1958	2,030	2,123	254
1959	2,098	2,083	242
1960	2,150	2,335	391
1961	2,257	2,838	288
1962	2,286	2,039	183
1963	2,332	2,622	447
1964	2,376	2,760	569
1965	2,344	2,500	546
1966	2,414	2,376	190
1967	2,513	2,457	219
1968	2,473	3,251	252

In all, there are six types of rice cultivation, as shown in Table II.B.3. Each type occurs in areas with similar topographical conditions, and the range of types reflects the Khmer farmer's remarkable ability to adapt to his environment. Since each type occurs during a different period, one may gain the impression of constant cultivation throughout a large part of the year, but in fact double cropping is rare.

During the 1960s, rice was grown mostly by smallholders. Out of a total of 840,000 farmers, 666,500 cultivated an average of 3.3 ha of paddy fields. Average farm size was larger in Battambang (4.0 ha), and smaller in the central plains (2.0 ha). The size distribution of farms was:

Farm Size (ha)	Percent of Farmers
Less than 1 ha	30.7
1 to 2 ha	21.3
2 to 5 ha	32.6
5 to 10 ha	10.4
10 to 20 ha	3.4
More than 20 ha	0.6

On the average 3 ha farm, the farmer possessed his own yoke or pair of either cattle or buffaloes. He had one plough, one harrow and very often a 200-300 kg capacity cart. Draft animals, always teamed in pairs, were used for ploughing, harrowing and transport, but all other farm chores were done manually. Farmers never used single animals for these tasks. Buffaloes were preferred in the heavy soils of the lowlands, but although they are stronger, they are also slower. Agricultural inputs were low. In 1968, only 17,800 tonnes of fertiliser were used (13,680 tonnes imported, 4,000 tonnes produced locally). Herbicide and pesticide use was negligible.

Manure was and is used, but only in nurseries in a very dry, strawless form. Silage is not used. Nevertheless, because of an earlier FAO programme on rice fertilisation and a development programme based on fertilisers (*Developpement de la production agricole*), fertiliser use was on the increase.

The low average rice yields achieved in Kampuchea can be explained by the irregular rainfall pattern, lack of irrigation and water control, low fertility of much of the soil, and low use of inputs and improved methods. It should also be noted, however, that total production tends to remain constant as large or small harvests of one type of rice are compensated for by the others. Some examples of achieved yields by province are: Kompong Cham 1.3 tonnes/ha; Battambang 1.2; Kompong Chhang, Pursat, Svay Rieng, Prey Veng, Kampot and Kandal 1.1; Takeo, Kompong Thom, Siem Reap and Kompong Speu, less than 1.0 tonne/ha.

Intensive rice farming is so far not widely practised and faces some challenges. For example, the area under irrigation is not very large. Mechanized cultivation is practised, but mostly in Battambang where private entrepreneurs used some 560 tractors to sow seed directly into extended fields. But even here, weeding and harvesting remain manual operations which have so far resisted mechanization.

Another aspect is the very wide range of rice varieties that are grown, each one responding to its own ecological conditions. Some of these do respond moderately to fertiliser and are quite disease and pest resistant; but it seems unlikely that the high-yielding IRRI varieties, which require high fertiliser applications and perfect water control, can be widely adopted. It is difficult to meet these conditions in Kampuchea and the best approach, which has already begun, may be to undertake agronomic research to select and develop local varieties for more intensive practice.

b. The past 10 years

Data on performance since 1979, gathered through the administrative system, is sometimes inaccurate. Nevertheless, the general area and production trends shown in Table II.B.4 can be considered reliable. The production figures at village level are accurate but there is some deficiency and delay in the actual processing. The authorities are quite aware of these problems.

Table II.B.2

RICE PRODUCTION BY PROVINCE AND FARM, 1962/63 AND 1966/67

		1962/63		Average	1966/67	
Provinces	Area	Output	No. of Farms	farm area (ha)	Area	Output
Battambang	443.0	664.0	76,600	5.8	473.2	452.0
Kampot	160.0	150.0	47,400	3.3	158.4	210.3
Kamdal	115.0	112.5	58,600	1.9	123.5	137.8
Kompong Cham	185.0	250.2	64,400	2.8	191.2	225.2
Kompong Chhnang	95.2	117.4	34,600	2.7	106.3	119.4
Kompong Speu	138.0	109.0	53,600	2.5	141.1	151.3
Kompong Thom	165.0	153.0	45,600	3.6	170.1	125.9
Kratie	16.0	21.3	9,000	1.7	21.3	21.7
Prey Veng	270.0	301.0	66,800	4.0	285.3	228.7
Pursat	96.0	115.0	27,000	3.5	99.5	97.7
Siemreap	220.0	133.5	43,700	5.0	273.2	241.2
Stung Treng	4.0	4.0	4,000	0.9	5.8	4.4
Svay Rieng	178.0	184.1	43,700	4.0	182.6	208.6
Takeo	223.0	231.0	76,200	2.9	243.7	197.0
Koh Kong	6.0	6.0	5,000	1.1	5.9	6.3
Ratanakiri	16.0	18.0	7,400	2.1	23.2	23.2
Mondulkiri	2.0	2.0	2,000	0.9	5.2	5.2
Kep					0.7	0.7
Kirirom					0.4	0.4
Total	233.2	2,622.0	666,500	3.5	2,513.6[1]	2,457.0[2]

[1] Of which 163,800 ha are cultivated in the dry season.
[2] Of which 183,900 ha are cultivated in the dry season.

During the past 3 years, rice production averaged an annual 2,090,000 tonnes, or about 84 percent of the 1960s.

Dry season rice was planted in an area similar to that of the 1960s, and yield has very significantly increased from 1 t/ha in 1979 to 2.4 t/ha (1988/89). Rainy season rice was planted in an area representing about 64 percent of that of the 1960s and the yield has increased from 1 to 1.3 t/ha, a slight improvement if compared to the 1960s average 1 t/ha yield.

The type of rice cultivation has changed: the area under floating rice has decreased, whereas area planted during the dry season has increased, as shown in the following Ministry of Agriculture percentages:

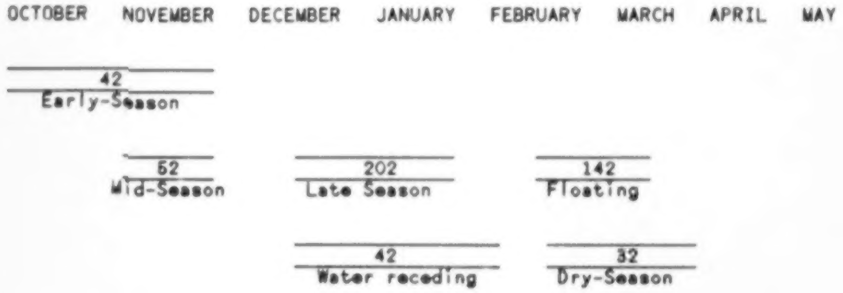
	67/68	83/85	88/89
Early season	15.6	12.26	17.85
Mid/late season	62.4	67.33	62.97
Floating rice	15.5	4.05	9.18
Dry season (upland rice)	6.5	16.27	8.16
	100.0	100.00	100.00

Table II.B.3

TYPES OF RICE AND CALENDER OF CULTIVATION IN KAMPUCHEA

Rice Cultivation	Planting	Sowing Period	Harvesting Period	Area %	Location	Remarks
Monsoon season				93		
Early-season	Replanting	May	End-Oct.	4	Upland	Most non-photosensitive rice
Mid-season	Replanting	May		54	Upland	Most widely cultivated
Whole-season	Replanting	May-June	December			Best yielding crops
Late-season	Replanting or direct sowing	June-July	January	20	Lowland	Direct sowing before floods
Floating	Direct sowing	April-May	Feb.-Mar.	15	Deeply flooded area (2-5 m)	Water rise has to be slow and progressive
Dry season				7		Non-photosensitive varieties
Water receding	Replanting	December	February	4		Replanting when water receding
Dry season	Replanting	January	Feb.-April	3	Close to dam or reservoirs	Strictly depends on irrigation

Harvest Calendar (based on 1960s data)



Source: Salle, J.C., Kampuchean Humanitarian Assistance Programmes (UN), 1984.

In 1984/85 there were 66 operating tractors and 83,300 ha under mechanized cultivation. 17,235 tonnes of fertilizer had been applied, about half of it in the dry season, as compared with about 17,000 tonnes in 1967 and 9,240 tonnes in 1968. In 1986/87 1,225 tractors were available, though it is not known how many of them were operational. In 1984/85 during the rainy season 150,000 ha were irrigated from reservoirs plus 50,000 ha during the dry season. There were 57 working pumping stations irrigating 8,700 ha, and 3,532 working small diesel pumps irrigating 95,000 ha. In 1985/86, 24,000 ha were cultivated with IR varieties. Current seed production had begun to be effective and efficient. However, increasing rat infestation is causing severe damage.

Table II.B.4

RICE AREA TYPES AND OUTPUT, 1979-1988 AND 1988/89

(a) Area Under Rice Production, 1979-1988 (ha)

Year	Wet Season	Dry Season	Total
1981	1,170,926	147,252	1,317,178
1982	1,485,847	131,321	1,615,168
1983	1,505,608	105,280	1,610,888
1984	943,344	117,127	1,063,451
1985	1,333,356	117,481	1,450,837
1986	1,413,653	118,041	1,531,694
1987	n.a.	n.a.	1,429,000
1988	1,724,000	100,000	1,824,000

(b) Rice Production and Yield, 1979-1988

Year	Production (tonnes)			Yield (t/ha)	
	Wet Season	Dry Season	Total	WS	DS
1979	475,450	84,820	565,270	0.80	1.00
1980	1,603,400	112,410	1,715,320	1.14	1.21
1981	1,234,500	256,111	1,489,611	1.12	1.30
1982	1,736,092	253,100	1,989,192	1.29	1.71
1983	1,841,037	208,158	2,039,192		
1984	1.023,917	235,073	1,258,990	1.26	2.14
1985	1,547,486	239,209	1,789,495	1.28	2.01
1986	1,805,845	280,187	2,086,080	1.42	2.26
1987	n.a.	n.a.	1,814,000		
1988	2,156,000	240,000	2,396,000	1.31	2.40

(c) Types of Rice Cultivation in 1988/89

	Area (ha)	Percent
Wet season	1,800,000	
Floating rice	180,000	9.18
Early season rice	350,000	17.85
Mid season & full season rice	444,500	22.67
Late season rice	790,000	40.30
Upland rice	35,500	1.81
Dry season	160,000	8.16
TOTAL	1,960,000	100.00

(d) Area Under Paddy and Yield, 1988/89

	Wet Season	Dry Season	Total
Planned area (ha)	1,800,000	160,000	1,960,000
Cultivated area (ha)	1,754,900	106,000	1,860,000
Damaged area (ha)	30,000	6,000	36,000
Harvested area (ha)	1,724,900	100,000	1,824,900
Yield (t/ha)	1.25	2.40	1.31
Total Paddy Output	2,156,000	240,000	2,396,000

Source: Ministry of Agriculture

There is no doubt that a significant improvement has taken place in both rice production and yields. One of the new trends in rice farming is intensive cultivation using the following technical packages: irrigation, fertilizers, insecticide and IR varieties of seeds. There is room for an intensive sector especially during the dry season. Whenever irrigation is available, the technical package should be applied. Moreover, the traditional sector could also benefit from the introduction of a more limited impact technical package, and this could have a potentially greater effect in increasing production because this sector represents 88 percent of total rice area.

c. Constraints on rice production

The area of intensively cultivated land is greater now than in the 1960s. There is more use of fertilizers and insecticides, more tractors and more land under irrigation. Also the yield for both rainy and dry seasons has increased. But the 1960s level of production has not yet been achieved due essentially to the decrease in the total area of cultivated land. The reasons for abandoning the lands are insecurity, lack of draft animals (see: Chapter II.C below), lack of labour force, difficulties in renewing the floating rice production (which fell because of seed shortage), lack of labour force at harvesting time, and probably lack of planning.

Land tenure. By 1989, 90 percent of the farmers had elected to transform their krom samakki to Level 3, as compared with 21 percent in 1981. The solidarity group as a rural organization unit may indeed disappear in the coming years, since the current policy of the Phnom Penh authorities is apparently to return to private ownership.

Resettlement/abandoned land. There are estimated to be large areas of land which, as already noted, could be resettled for the cultivation of rice and other crops. These areas could be re-possessed by returnees from the Border Camps, as well as low-income farmers coming from populated areas such as Takeo, Kompong Speu, and Kompong Chhnang. The Agriculture Department together with the French NGO GRET is currently surveying possible resettlement areas by investigating the availability and potential of the land, basic services such as schools, dispensaries and drinking water to absorb more people. The survey findings will be used to design a resettlement policy and to define the kind of assistance the province or central government should provide, including the supply of draft animals, implementing tools, construction materials for housing, etc. Given the current situation in the country one of the key issues could be the supply of draft animals which might be procured from Thailand.

Lack of labour force. A prime constraint in expanding production is the lack of labour, which is due to a decrease in the overall numbers of adults, to the high proportion of widows, and to a significant number of handicapped persons. Widows are managing 20 percent of the farmland and will face increasing difficulty because the disappearance of the *krom samakki* Level 1 means that they will not have the same access to labour. One way to assist is that being used in a UNICEF project which aims to improve the production of the area near the houses (fruit trees, sugar palms, vegetables, food crops, etc.). Although this kind of project is useful, it may well be that, to resolve this problem, widows should be awarded something along the line of a national pension for all widows, perhaps supported by external financing.

Table II.B.5

POTENTIAL AND ACTUAL CULTIVATED RICE AREA

Year	Potential (ha)	Actual (ha)	Utilization Percent	Remaining Area (ha)
1979	2,557,000	770,510	30.0	1,787,000
1980	2,557,000	1,436,460	56.0	1,121,000
1981	2,557,000	1,491,654	58.3	1,066,000
1982	2,557,000	1,680,300	65.7	877,000
1983	2,557,000	1,739,951	68.0	818,000
1984	2,557,000	1,416,781	55.4	1,141,000
1985	2,557,000	1,516,000	59.3	1,041,000
1986	2,557,000	1,617,143	63.2	940,000

The considerable potential for expanding rice production is indicated in Table II.B.5, which compares the extent of potential paddy land with the area already under cultivation.

3. Other Crops and Plantations

a. Subsidiary Crops

Production prior to 1980

In the 1960s, subsidiary crops were grown on a total area of about 230,000 ha, which was 8 percent of cultivated area. Main growing areas were the river banks (levees) all year round, and the upper terraces during the rainy season. In 1967, the main crops were white and red corn, 150,000 tonnes; beans, 25,000 tonnes; cassava, 23,000 tonnes; groundnuts, 20,800 tonnes; sweet potatoes, 12,800 tonnes; sesame, 9,800 tonnes; and soya, 7,300 tonnes.

About 130,000 ha were planted to corn. Of total production, 130,000 tonnes was red corn, and 25,000 tonnes white. Most of the red corn was exported. Growing areas are mainly in Prey Veng, Kandal, Kompong Cham and to a lesser extent Kratie provinces. Corn is usually grown on the river banks, three-fourths before flooding (sown in April) and one-fourth after it. White corn is traditionally harvested before maturity. The yield varies from 1.0-1.5 tonnes per ha, but this could easily be increased through improved cultivation methods.

About 29,000 ha of river bank and low land were planted to beans each year. The river bank crop covering

20,000 ha was planted after the flood as the water was receding, while 8,000-9,000 ha of cleared flooded forest near the Tonle Sap were planted before the floods. In addition, beans were also grown on upland red and black soils in Kompong Cham and Battambang provinces from April to July. Yields varied from 350-450 kgs/ha. The beans are consumed as bean sprouts. Small quantities were exported.

Sweet cassava was grown in the red plateaux soils of Kampot, south Takeo and Kompong Cham provinces. Yields varied from 15-18 tonnes per ha. Sweet potato was grown in Kampot province and along the river banks, but consumption was decreasing.

Recent performance

Among subsidiary crops, the output of corn declined drastically from 1979 to 1989. In the latter year, production only reached 34 percent of late 1960s production. Table II.B.7 shows its level and yield in 1988/89, along with those of cassava and sweet potato. Groundnut and vegetable production represented only 20 percent and 38 percent respectively of the late 1960s. However, production of sesame, soya bean and mung bean almost reached late 1960s production levels.

b. Rubber

The country's first rubber plantation was established in 1921. From the very beginning, the general plantation policy was clearly laid down. Plantations were required to occupy single, large tracts of land, be export-oriented, use high technology, and be managed by financially sound companies. They were also to have their own processing facilities. Support would be available from the French-run IRCC, the "Institut de Recherche du Caoutchouc au Cambodge". In 1964, this institute was integrated into the royal university of Kompong Cham. Five large plantations had been created since 1927. They were Compagnie du Caout-chouc, Societe de Mimot, CAMECONG,[4] SCKT,[5] and SPK.[6]

Since 1958 several new private companies, state-run agencies and family-based concerns had been set up. The situation in 1967 was:

	Area (ha)	Production (tonnes)	No. of Factories
Cie de Cambodge	21,235	21,500	3
SPRW	14,589	18,991	2
CAMEKONG	5,721	6,856	1
SCKT	4,949	4,871	1
SPK	4,558	5,156	1
Sub-total	45,151	50,518	7
State run and other plantations recently created	6,453	832	-
25 medium scale plantations	3,155		
2,053 small plantations	7,422		
Total	62,211	51,350	7

In 1967, the total area under rubber amounted to 64,000 ha for a combined production of 53,700 tonnes of rubber. 27,000 workers were employed. Total output represented 2.2 percent of world production and 2.6 percent of Kampuchea's GNP. Rubber production generated a very reliable and steady source of income and it was always of either first or second importance in earning foreign exchange.

Most plantations are located in either Kompong Cham or Kratie provinces on the red plateaux soils. These soils are deep, permeable, fertile and highly suited to rubber. The latest large plantation to be established was a 2,400 ha state-run concern in Ratanakiri in 1967. There is still a large potential to extend rubber plantations on the plateaux. There has been a revival of rubber production in recent years, with assistance from countries in Eastern Europe. For details see Chapter III.A.

c. Fruit Trees

The main characteristics of tree crop fruit production in Kampuchea were: a large variety of species, scattered family-based plantations, a preponderance of grower consumption (75 percent of production was consumed by the growers, and only 25 percent was marketed) and a concentration of the activity in the Battambang region. Species, acreage and production in the late 1960s were:

Species	ha	Production (t)
Banana	20,600	133,000
Pineapple	2,200	153,000
Mango	7,100	48,400
Orange	2,800	23,300
Grapefruit	500	6,400
Lime	400	5,200
Mandarine	300	1,800
Brazil nut	1,200	400
Longone	600	1,200
Rambutay	300	400
Durian	300	700
Total	36,300 ha	236,500 t

Battambang province had 13,900 ha of fruit tree plantation (38 percent of total) producing 75 percent of the orange crop, 50 percent of mangos and 40 percent of bananas. Production increased 35 percent between 1950 and 1967 and since then, oranges were exported to Viet Nam (11,800 tonnes in 1968).

Sugar palm trees could be seen all over the Khmer rice farming landscape, growing on dikes and small levees. It is estimated that there were some 2 million trees altogether of which some 33 percent were exploited. Concentrated mainly in Kandal, Kompong Speu and Kompong Chhnang provinces, production was about 40,000 tonnes annually. Production of sugar requiring firewood was decreasing in Takeo, but in some areas, particularly Takeo, and Kompong Speu, sugar production represented an important income for small and poor farmers.

Coconut is an important ingredient in Khmer cooking and is therefore consumed mostly as a fruit. Copra or coconut oil are not used. Consumption is important nutritionally and is likely to increase. 20,000 ha of plantation would be enough to meet national needs compared to the present 16,000 ha. In 1968, production was achieved mainly from scattered trees although there was some small plantations grouped especially along the coastal areas totalling 1,590 ha. The main production areas were in Kampot, Battambang, Kompong Cham and Koh Kong provinces. Coconut farming was encouraged by the Government and had technical backing from the French institute IRHO in Tuk Sap, 20 kms east of Kompong Som.

Some 450 ha were planted with coffee in Kampuchea of which 250 belonged to "La Societe des Plantations de Pailin". In this well-managed, irrigated plantation where 230 ha were planted to robusta coffee and the rest to arabica, average yields varied from 1,200-2,200 kgs per ha. In 1966, domestic demand was met and 240 tonnes were exported. There is considerable potential to establish new arabica coffee plantations on the forested red soils of the plateaux.

d. Other produce

Production of cotton was concentrated in two areas, the red plateau soils and the Battambang black soils. Battambang and Kompong Cham provinces each had two industrial gins which were integrated with spinning operations. The table below gives cotton output for 1968/69.

Soil Type	Area (ha)	Output (m^3)	Yield (m^3/ha)
Kompong Cham red soils	2,657	2,729	1,027
Kompong Thom red soils	415	545	1,300
Kratie red soils	45	36	0,800
Battambang black soils	3,202	2,770	0,860
Kandal river bank	25	15	0,600
Total	6,344	6,285	0,990

Mechanized farming on the plateaux soils is possible, but there has been no response to fertiliser application in both areas and the crop is very vulnerable to pests. Since 1967, the area under cotton increased substantially, from 2,260 ha to about 12,000 ha in 1969/70. 15,000-20,000 ha at yields of 1.0 tonne per ha would have been needed to meet domestic demand. Sufficient land is available for the expansion of cotton crops.

About 5,000 ha of jute was cultivated on lowland clay/loamy soils in Battambang province. Harvested in lightly flooded conditions, retting takes place in the field. Average dry fibre yields were about 1.0 tonne/ha. Fibre was transported by farm cart to the SOKJUTE factory near Battambang which could process about 6,500 tonnes of fibre per year. The factory's output of gunny bags now faces strong competition from imported nylon sacks.

Production of tobacco was generally family-based and was spread out along the river banks. Farmers generally formed their own cooperatives to run their own kilns. The main production areas were in Kompong Cham, Kandal and Kratie provinces. Output in 1967 amounted to about 10,000 tonnes grown on 17,400 ha. Cigarette production from two factories using local tobacco was sufficient to meet local demand.

The production of jute has greatly exceeded the production levels reached during the late 1960s and the former SOKJUTE factory is operating at full capacity. Sugarcane, cotton and tobacco production has declined. Reportedly, rubber plantations and rubber factories have resumed significant production and currently are supplying the tyre processing unit and exporting. However, production figures are not available.

4. Needs and Priorities

a. Technical services and training

Applied research

The International Rice Research Institute (IRRI) started a programme two years ago to build a rice research capacity in the country. This programme includes training at IRRI for Kampuchean extension workers. Other major components are the testing of rice varieties, strengthening of agricultural statistics collection, and the design of the Cambodian Research and Development Institute (CARRDI). IRRI has identified other areas where further assistance is required. These include research in soil science, pest management, agricultural engineering and extension, perhaps costing up to $4 million.

OXFAM-Belgique has assisted the Prey Phdau agricultural research station. The objectives were (1) to rebuild the station facilities to operate a research programme and seed production; (2) to train 4 Khmer technicians; and (3) to extend the programme to farmers' fields. The programme has mainly consisted of screening new varieties and fertilization trials.

GRET is developing a programme of appropriate technology, by testing new agricultural implements for tillage, threshing etc., and improved technical package for rice growing.

There are other research stations in the country such as the Corn Experiment Station at Kandal, and the Plant Protection Research Station. The Department of Agronomy is responsible for all stations. No information has been obtained about their work.

Extension services

The extension services programme is very limited due to a lack of trained people, motorized vehicles and necessary inputs. Although a large number of extension workers are employed at each level from the village up to the province, a large part of their time is spent on administration and data collecting. Very little time can be given to training of farmers and demonstration of improved techniques. No demonstration programme has so far been developed, and only a few people have been trained in agriculture.

Seed production

It is understood that this has been developed, but accurate information on output, production system and the establishment of networks is not available. It seems that the production of rice has concentrated on IR varieties.

Training services

This aspect is detailed in Chapter V.C. below. A four-year Agriculture University at Chamcar Daung was established in 1985 and the first graduating class of 60 students will complete their studies in 1989. Prek Leap

Agricultural Technical School offers a two and a half year course. Province agricultural schools have been set up in Kampot, Battambang and Takeo.

Machinery and Pumps

The Agriculture Department has rebuilt the tractor fleet and even surpassed in numbers the tractors available in the 1960s. Also, the Department has built a network of repair and spare parts workshop for tractors and pumps, building on the organisation set up in the time of the Khmer Rouge.

b. Agricultural sector issues and priorities

Constraints on agricultural production are:

- staff capability at the Ministry of Agriculture to develop agricultural production is still inadequate to cope with the existing situation;
- Ministry of Agriculture planning and monitoring capability;
- large areas of abandoned land;
- decrease in the number of draft animals;
- lack of labour force, including the widows issue;
- lack of a viable credit system;
- weakness of extension services; and
- inaccuracy of monitoring systems.

Training is necessary in many fields: farming techniques, applied research, seed production, mechanization, specific crops, extension methods, rural economy, irrigation techniques, vegetable production, etc. This training must be practical in nature, with the technicians being directly involved with farm production.

First priorities to develop the agriculture are to:

- develop a planning capability in the Ministry of Agriculture;
- extend and complete the technical training of the technicians and extension workers, and to design and develop an extension programme;
- bring into cultivation the abandoned land through resettlement from the border camps and from populated areas;
- institute a policy on the matter of financial assistance for widows in the labour force; and,
- reinforce the above-mentioned applied research concerning soil preparation, threshing and husking machines, floating rice technical package and rice low-impact technical package.

Second priorities are to:

- promote credit at the village level for short and medium term loans;
- improve high quality seed production including vegetable seeds;
- manufacture hand tools, tillage implements, threshing machinery, etc;
- survey the opportunities of creating processing units in the countryside based on agricultural production;
- assist the rubber plantation sector which presently produces the main source of export income;
- expand phosphate production; and
- expand small irrigation schemes.

Third priorities would be to:

- create new plantations for export and internal purposes (Arabica coffee, coconut, fruit trees); and
- promote handicrafts in the countryside for export and international purposes.

C. LIVESTOCK

The point has already been made that, in Kampuchea, there is an intimate relationship between the numbers and quality of livestock and the production of the main crop, rice. This is because livestock are used almost entirely for the preparation of fields. It is therefore of great importance to review livestock in this context.

1. The Period Prior to 1970

During 1955-1967, livestock production doubled at annual rates of 7.9 percent for cattle and 10.8 percent for buffaloes. In the meantime, cultivated area increased from 1,740,000 to 2,513,000 ha, and population growth was 30 percent. These data show the linkage between livestock population and (1) the area under cultivation and (2) the numbers of families owning a pair of cattle or buffaloes. In 1970, the estimated national livestock population was about 3,104,000 head of which 2,233,000 were cattle (71.7 percent) and 881,000 buffaloes (29.3 percent). The increase was due to sanitary improvements and expanded work animal requirements.

In 1967, the livestock structure was:

	Cattle Percent	Buffalo Percent
Adult Male	5.0	2.00
Castrated male, over 3 years	43.6	30.18
Castrated male, under 3 "	17.5	19.00
Total males	61.1	51.18
Females over 3 years	24.4	30.13
Females under 3 "	15.5	18.69
Total females	38.9	48.82

Khmer farmers used to raise livestock only for farming, namely rice growing. Ploughing, harrowing, transportation are all essentially carried out by a yoke of cattle or buffalo (owned or rented). There is no tradition of using a single draft animal. Livestock raising is not oriented to production and sale and as a result it is not really a source of income. Khmer farmers consume very little milk or meat, or none at all. According to Buddhist traditions, the ox or buffalo is the farmer's companion and females are only required to produce more draft animals. The farmers, however, used to sell extra livestock, but since Buddhists cannot slaughter animals but can eat meat they were slaughtered by Cham butchers. The livestock structure reflected the Khmer farmer's attitude and the way he approached animal husbandry.

The high proportion of oxen (44 percent) shows the importance of draft animals. The equal number of castrated male buffaloes and females shows that they were also both used as draft animals. The cow was not used as a draft animal and was very often sold to butchers even though the slaughter of females under nine years old was prohibited. For all these reasons, the number of females fit for reproduction was insufficient achieve a normal growth rate.

Livestock fencing for manure production is not a traditional practice, neither is forage cultivation. Animals freely graze the farms and natural pastures during the dry season. During the rainy season, farmers pay more attention to the cattle and long periods of rest, daily washing and additional feeding are common practices.

The ratio of cattle to buffalo in the provinces differs according to soil conditions. Buffaloes, both male and female, are more suited to heavy soils in lowland rice fields. Although buffaloes are very strong, they are at the same time rather slow. Buffaloes can be fed with rough forage or pasture. Cattle (only castrated males) are more suited to light upland soils. In Takeo, Kompong Speu, and to a lesser extent in Siem Reap and Battambang, cattle predominate. In Svay Rieng, Prey Veng and Kratie the number of buffaloes and cattle is almost the same.

The most widespread (fatal or highly debilitating) diseases are haemorrhagic septicaemia, symptomatic cholera, rinderpest and foot-and-mouth disease. Farmers were gradually accepting the vaccination campaigns. Starting in 1962, a large campaign aimed at eradicating rinderpest was finally successful. The Pasteur Institute was producing sufficient quantities of cattle vaccines and supposedly was meeting the needs of the country for most vaccines.

Pigs, Poultry and Miscellaneous. Pig production almost tripled between 1955 and 1967 (See Table II.C.1), but remained low (about one pig per family). The Buddhist attitude can partly explain this trend. The pigs were sold to Chinese butchers when they reached 70/80 kgs weight. In Kandal, Prey Veng and Svay Rieng wealthier farmers gave piglings to small farmers who raised them for a share of the proceeds. About 100 commercial pig breeders used rice by-products, cassava and sweet potatoes for feed. The Livestock Department supplied large white and middle white parents, but very few were distributed to farmers. Family-based pig raising used paddy bran, paddy, trunks of banana trees, etc. No vaccination was undertaken.

Ducks and duck eggs were consumed more by the Vietnamese, Chinese and Sino Khmer. Nevertheless, more and more Khmers were raising ducks as their main activity in permanent ponds with rice branfeed.

Table II.C.1

LIVESTOCK POPULATION 1953 - 1969

(thousand head)

Year	Cattle	Buffalo	Total	Pigs	Poultry
1953	829	253	1,081	326	1,968
1954	894	294	1,188	382	1,760
1955	922	297	1,219	387	1,624
1956	978	321	1,299	438	1,830
1957	1,033	329	1,362	360	1,733
1958	1,023	336	1,359	398	2,177
1959	1,156	390	1,546	519	2,617
1960	1,247	437	1,684	616	2,735
1961	1,276	425	1,711	671	2,782
1962	1,276	471	1,747	689	2,927
(*)	(1,646)	(499)	(2,115)	(887)	(n.a.)
1963	1,402	512	1,914	845	3,495
1964	1,529	577	2,106	933	4.002
1965	1,657	637	2,294	991	4,226
1966	1,737	654	2,391	1,057	4,656
1967	1,815	684	2,499	1,078	5,532
1968	1,918	718	2,636	1,151	5,756
1970 estimates:	2,233	881	3,114	n.a.	n.a.

Source: Ministry of Agriculture, Livestock Department

(*) The bracketed figures give the result of the 1962 herd-census.

Family-based poultry raising has not greatly changed. From 6 to 20 birds were raised by each family. However, in Kandal, Kompong Cham, Prey Veng and Takeo, production had greatly increased. Around Phnom Penh, modern small poultry farms had been set up, mostly managed by Chinese. They supplied the Phnom Penh market. Poultry development was mainly based on government distribution of Leghorn or Rhode Island breeds to farmers.

Exports and Livestock Industry. There were no well-equipped modern abattoirs in the country, even in Phnom Penh, so that by-products were not used except for bones and horns. There were no cold rooms either, and no possibility of storing carcasses. In dairies, a 1960s FAO-assisted dairy project in the neighbourhood of Phnom Penh (Stung Meanchey) promoted smallholder cow ownership and began a pilot plant in 1969 of about 2,000 litres daily capacity. Fresh milk collected from local farmers and combined with powdered milk and butter oil provided the Phnom Penh market with pasteurized and homogenized milk. The dairy was destroyed in the 1970s. Also in the late 1960s, a private dairy (20 percent state participation, 80 percent a joint venture between Australian and Danish companies) produced concentrated milk from imported powder. The plant ceased production in 1970.

As for exports, the practice of growing and providing feed for animals was not known. Land was not used specifically for this purpose. In the long run, however, it is considered that Kampuchea has good potential for developing meat production for export.

2. The 1970-79 Period

From 1970 up to August 1973, heavy and repeated bombing occurred in the Svay Rieng, Prey Veng, Kandal and Kompong Cham provinces and in areas surrounding the main cities. This killed a great number of cattle and buffaloes.

During the Khmer Rouge period, the use of draft animals shifted to transportation (goods, rice, arms, propaganda materials, etc). Ploughing and harrowing were carried out by human beings. This new use of draft animals led to the assembly of large herds, resulting in the widespread recurrence of disease. Rinderpest, which had been eradicated in the 1960s, reappeared and extended to the Thai border. Aphtous fever also became rife. Total lack of vaccines, veterinarians and disease control caused a large reduction in livestock, so that 30 years of effort to improve livestock health was negated in 4 years.

As the Khmer Rouge retreated in early 1979, large numbers of livestock were slaughtered for immediate consumption by starving population. By 1979, about two-thirds of total livestock was killed, and most of the remaining animals suffered from weakness, under-nutrition and disease.

3. 1979 Up to the Present

Since 1979, cattle and buffalo herds have recovered, and in 1988 reached 2.6 million head, about 80 percent of size of the 1970s herds. Statistical data available only from the beginning of 1984 show that the 1984-1988 growth rate was about 6.7 percent a year. Backward projections using the same rate would give a 1979 population of about 1.5 million head, less than half the 1970s herds.

Year	Head ('000)	Yokes ('000)	Cultivated Area ('000 ha)
1969	3,100	1,030	2,650
1979	(1,470)	411	780
1980	(1,870)	523	1,480
1981	(1,680)	560	1,980
1982	(1,790)	596	1,640
1983	(1,910)	636	1,610
1984	2,040	680	1,400
1985	2,170	723	1,500
1986	2,300	766	1,600
1987	2,400	800	1,530
1988	2,600	866	1,800

The present cultivated area, which is 70 percent of the 1970s cultivated area, is ploughed using 80 percent of 1970s yokes. It seems clear that the extent of the cultivated area is linked to the number of yokes available, so that any increase in area under cultivation must imply an increase in the number of draft animals. In addition, livestock is not as healthy as it was in 1970. Some provinces are experiencing a shortage of draft animals, thus reducing the area of cultivated paddy lands, particularly in Battambang, Prey Veng and Takeo. If we consider potential paddy land, the shortage extends to most provinces except Kompong Cham. In an attempt to overcome these deficiencies, Lutheran World Service is operating a breeding station for draft animal production and importation.

Livestock health conditions. A haemorrhagic septicaemia disease diagnosis lab has been set up by Church World Service. A vaccine making unit has been put into operation by American Friends Service Committee. Both NGOs have set up a refrigerated vaccine distribution system, with cold boxes at provincial level. Nevertheless, there is not a continuous cold chain for vaccine distribution.

The numbers of animals vaccinated in recent years against various contagious diseases (in thousand heads) were:

	1984	1985	1986	1987
Foot & mouth disease	430	352	235	192
Pasteurlosis	661	571	435	494
Anthrax	582	103	220	27
Rinderpest	82	138	360	139
Blackleg & malignant Oedema	366	227	417	535

Pigs and poultry. Lutheran World Service has set up a piggery production centre in Kampot. Currently farmers with 7 to 8 pigs are common, but feeding material is short.

4. Priorities and Needs

The main priority is to complete the rebuilding of the draft animal population in order to put more area under cultivation and reach the 1960s total cultivated area. In addition, cattle, pigs and poultry raising should be viewed as a means to raise farmer's cash income.

Among measures to rebuild the draft animal population, the most easy to implement would be disease control. An efficient disease control system requires:

- A continuous cold chain including vehicles, cold rooms, solar refrigerators and cold boxes. The chain would allow the veterinary department to provide vaccines to all provinces.

- Additional vaccine production. One unit in Phnom Penh currently produces 600,000 units of haemmorrhagic septicaemia vaccine per year (with assistance from American Friends Service Committee). Vaccination reportedly covers only 30 percent of the country instead of the 80 percent considered necessary to control the disease. Farmers do not pay for vaccinations at present, and the American Friends Service Committee is subsidizing the veterinary department for both vaccine production and vaccination. An expert from Sri Lanka, a country with good expertise in medium technology vaccine production, has assisted in vaccine production. Khmer lab technicians have been trained in Laos. Not all vaccines can be produced in Kampuchea, some of them requiring too sophisticated technology. Nevertheless, as far as technology allows, full production should be launched to match Khmer consumption capacity.

- Additional adequately equipped veterinary laboratories. One is operated by CWS in Phnom Penh, with technical assistance. The most appropriate location for a new laboratory would be in Battambang.

- Trained technicians for vaccine production and distribution, for disease diagnosis and for refrigerator repair; and

- Technical assistance in most if not all the above.

In pigs and poultry, there are considerable opportunities to supply almost one million inhabitants in Phnom Penh with these foods. The major constraint would be lack of animal feed. A feed processing unit with two production lines (one for pigs, one for poultry) would help significantly. Raw materials, produced in Kampuchea, would consist of maize, sorghum, dried cassava and available agro-industry wastes. The processing unit would have to be very robust and easily repairable.

D. FISHERIES

1. Resources

Because of the unique ecological phenomenon of the country, mainly the annual flooding of the Great Lake (Tonle Sap), freshwater fish resources are abundant. Also national offshore sea areas have abundant fish. The fisheries can be divided into three sectors, namely the Great Lake or Tonle Sap, which is mainly fished by full-time fishermen; local and family-based fishing, which takes place throughout the country in the dense network of "Prek", "Beng", "Stungs", flooded areas and rice fields; and the marine fisheries in coastal waters. To preserve stocks, freshwater fishery is prohibited from June 1 to October 1 north of the "quatre bras" confluence, and from July 1 to November 1 in the south.

As one of the most valuable resources of Kampuchea, the Tonle Sap ecology must be carefully protected. However, this valuable resources has been deteriorating since the 1950s. The main causes of this decline appear to be closely linked to environmental deterioration, including increased siltation, destruction of substantial portions of flooded forest (converted to floating rice production or exploited for firewood) resulting in a reduction of fish nursery and feeding areas. Overfishing and fishing during the prohibited period may also be a significant cause of decline in fish yields.

Consumption of fish and fish products can be broken down as:

Fresh fish	72 percent
Dried fish	10.16 percent
Fermented fish paste or prahoc	14.2 percent
Fish sauce	2.2 percent

2. Situation Before 1970

a. Fish production

About three-fourths of production came from fresh-water fisheries. According to Jean Delvert, fresh-water annual output in 1960 was about 100/120,000 tonnes, two-thirds of it coming from Tonle Sap. In 1966, the total catch amounted to 166,000 tonnes of which 124,000 tonnes came from fresh water and 42,000 tonnes from the sea.

Great Lake production. The Great Lake, with an area of 10,000 km^2, used to be the most productive freshwater fishery in the world. In the early 1930s, annual catches were estimated at 100,000 tonnes of which more than 50 percent was exported. By 1940, the Great Lakes produced about 78,000 tonnes. It was estimated to be, on a unit area basis, about 10 times more productive than the average fishing ground in temperate countries, and about 5 times more productive than a well-managed fish farm in Thailand. Although the ecology of this productivity is not completely understood there is evidently a close link between it and the flooding of nearby plains and forests. About 90 percent of the fish in the Mekong system spawn in the lakes and surrounding flooded plains and forests.

Fishing community and fishing organizations in the Great Lake. The majority of the fishing community consisted of ethnic Vietnamese and Cham "Khmer Islam" who were occupied in full-time fishing. Areas of the lake, together with a large proportion of the "Beng" and "Prek", were allotted through a 2-year tender system. No ice plants or cold storage facilities were available in the area. Live fish was transported by truck to Phnom Penh and other Kampuchean cities.

Family-based fishing. In the flat and flooded plains, in the numerous reservoirs, in the allotted "Beng" and "Prek", in the "Stungs", in the receding waters, and in the rice fields, Khmer farmers have always caught fish. Small-scale fish farming was also practised by feeding animal and kitchen wastes into small ponds.

Marine fishing. Sea catches accounted for about one-fourth of total fish catch with an annual 40,000 tonnes output. Only coastal national waters were fished. Fishermen used small motorized craft without refrigeration. A fish cannery was set up in Koh Kong province and fish meal production for animal feed also began. Shrimps were also caught, but the production was low.

3. The Situation during 1970-79

Very few data are available from the 1970-1975 period. Insecurity and lack of access to many provinces made both management and monitoring of production difficult. Support from the Fishery Department was probably very weak. The wide-spread bombing, the large forced migrations, fish marketing, the lack of fishing inputs, all contributed to decreased production in both family-based and professional fishing.

During the Khmer Rouge period, most ethnic Vietnamese and Cham were killed or fled. The consequent lack of expertise reportedly resulted in "underfishing" the Lakes. As family production and organization was destroyed and most families left their original villages and were parted from their fishing equipment, family-based production almost halted. Everything was oriented to rice production and digging irrigation canals.

Two other factors contributed to lower freshwater fish yields: a large part of the flooded forest near the Great Lakes was destroyed, and the natural migration patterns of fingerlings and pregnant females towards the flooded forest were somewhat disrupted by the excavation of the so-called "Pot Pol canals" and dikes.

Marine fishing probably stopped or was considerably reduced. The Koh Kong fish cannery was abandoned.

4. 1978-79 to the Present

Organized fishing was reportedly resumed in the early 1980s, as some of the former fishing community came back and as farmers resettled in their original villages. However, fresh-water fisheries appeared to have been severely affected by the Khmer Rouge period, particularly through a drastic reduction in the number of full-time and part-time fishermen; a lack of basic materials such as fishing nets, hooks, floats, etc.; a lack of skilled technicians and closure of the *Institut de Recherche Piscicole*, which was founded in 1957; and a lack of motorized boats and trucks.

The clearing of the flooded forest and the "Pol Pot canals" referred to above, as well as the siltation of the quatre bras were other contributing factors in the decrease of fish yields. Because annual dredging had been neglected since 1974, resulting in significant siltation of the Mekong at the "quatre bras" confluence (upstream of Phnom Penh a large sediment island has emerged), large numbers of fingerlings and pregnant females were carried downstream to Phnom Penh instead of Tonle Sap.

The marine fisheries also faced serious difficulties because of a reduction in the number of fishermen, the lack of small trawlers and cold storage facilities; and the complete disruption of this formerly productive sector.

Freshwater fisheries recovered rapidly from 1979 (20,000 tonnes) to 1982 (68,700 tonnes). But from 1983 production decreased to 56,000 tonnes in 1984. The main cause of the decrease seems to have been an acute lack of fishing nets. In 1986 and 1987 production again reached the 1982 level. As home fishing gear, fishing nets and motors are still in short supply, production is unlikely to increase further. However, in comparing the 1960s and 1980s catches, the earlier statistics included all catches, including family fishing, whereas total fisheries production after 1979 excludes family fishing. To compensate, approximately 13,000 tonnes should be added to the figures and if this is done, 1987 production would amount to 80,000 tonnes, or 66 percent of the 1960s output of 120,000 tonnes.

Fisheries organization. Despite FAO support during the emergency operation of 1979-82, production recovery has been hampered by lack of basic fishing gear, nylon thread for fishing net manufacture, and motors for fishing boats.

Table II.D.1

ANNUAL FISH CATCHES FROM 1980 TO 1987

metric tonnes

	Annual Catches							
Province	1980	1981	1982	1983	1984	1985	1986	1987
Freshwater								
Phnom Penh	2,000	4,840	6,182	4,091	4,716	5,740	7,500	4,200
Kandal	1,500	5,340	10,988	4,582	7,698	10,375	15,182	10,800
Kompong Cham	1,000	1,060	3,071	4,519	3,823	4,280	4,553	5,140
Takeo	600	127	1,399	1,617	772	1,447	1,430	1,269
Kompong Thom	2,500	1,437	4,828	1,240	4,620	2,470	2,582	5,180
Siem Reap	2,000	8,651	8,266	8,202	7,932	8,450	9,041	9,575
Battambang	1,000	4,775	6,663	6,647	4,859	3,700	3,790	3,500
Pursat	2,500	6,475	8,734	8,252	5,913	5,410	5,990	7,000
Kompong Chhnan	2,000	8,651	11,589	10,724	12,332	10,220	9,660	12,100
Stung Treng	1,000	96	187	900	400	670	520	450
Kratie	1,000	-	892	1,180	896	1,500	1,552	1,140
Dept. of Fisheries	-	2,651	-	-	-	-	-	-
Others	-	5,000	-	-	-	-	-	-
Total Freshwater	18,100	50,638	65,701	53,651	55,003	56,400	64,151	62,154
Marine								
Kampot	200	443	1,885	3,396	5,670	5,216	2,396	5,000
Kampong Som	500	371	600	2,068	1,363	2,248	1,202	4,000
Koh Kong	500	-	450	-	2,000	3,714	3,648	3,000
Total Marine	1,200	814	2,935	5,464	9,033	11,178	7,246	12,000
Grand Total	19,300	51,452	68,636	59,115	64,036	67,578	71,397	74,154

Source: FAO 1988 Report from Fisheries Department

A 1984 FAO report produced the following information:

- present fish per capita consumption was about 27 kg per year;

- fish catches seemed threatened to some extent by use of pesticides in the rice fields;

- a disturbing disease affecting freshwater fisheries had appeared for the first time; all the main fishing areas seemed to be affected.

Freshwater fisheries are now organized into three sectors; namely, state fisheries enterprises, employing 409 persons, solidarity groups (krom samakki) employing 6 to 10 families in 972 groups, and family fisheries. There are recent reports of some changes in the Tonle Sap fishermen's community. Solidarity groups have been trained apparently to fish in the allotted lake fisheries, and in the near future, more people will be involved.

FAO and NGO support. During the emergency operations, FAO helped fisheries to recover from 1979 to 1984 by supplying basic fishing gear, nylon thread and small motors. FAO also supported the identification of freshwater fish diseases. A national fish station with technical assistance from FAO is operating and it produced a significant quantity of fry in 1984. Since that time, both PADEK and the World Council of Churches NGOs have been providing assistance in inland fisheries.

Marine fisheries. Annual production has recovered very slowly and seems now to have stabilized at 12,000 tonnes, far below the 40,000 tonnes of the 1960s. Many constraints still hamper production. However, construction of a prefabricated cold storage unit near Kompong Som is under way by Ricoffi, a French company. Fisheries Department figures show about 1,000 small trawlers operating in coastal waters. The boats are built in Kampuchea. Fishing nets and motors come from Thailand. However, these figures seem very high given the limited size of the present fish catch. In addition, it is not known how these trawlers could have been financed.

5. Priorities and Needs

The following priorities have been identified:

Freshwater fisheries. It is suggested that emphasis should be given to a prompt increase in catches and to assistance in rebuilding the fisheries resources in Tonle Sap. Also, training of skilled technicians should be one of the most important immediate needs. The following priorities are therefore presented:

- A significant increase in fish production in the coming two years would require the supply of basic fishing gear, of nylon thread for fishing net manufacture, of 5/10 HP engines for motorized boats, of trucks for marketing purposes, and of 4-wheel drive vehicles for the Fisheries Department.

- The same increase would also require cold storage facilities in the neighbourhood of Tonle Sap.

- Rebuilding national fish resources would require the dredging of the Mekong and the "quatre bras" confluence and replacement of flooded forests.

- Very practical medium level training is urgently needed for operators and technicians in the field.

- As fish farming and aquaculture are new activities in the country, some preparatory steps are required. In particular, training of technicians, field experiments, and surveys to define the appropriate area and design a medium-size project are required.

Marine fishing needs. The export of marine products can earn valuable foreign exchange. This is realized by the Phnom Penh authorities, and a cold storage facility is under construction in Kompong Som. Marine fisheries should be promoted through the supply of more engines, sea fishing nets and other equipment.

Other projects. The projects listed below, although important, do not have first priority. They could be undertaken in the medium-to longer-term:

Freshwater fisheries: commercial fish and prawn farming; fingerling production unit for Tonle Sap; development of family-based fishing project.

Marine fisheries: creation of an "Oceanographic Institute" in Kompong Som; installation of a fish cannery in Kompong Som.

E. FORESTRY

1. Resources

a. The situation before 1970

i. Forest land - main features

A forest inventory was carried out by the *Institute de Recherche et d'Enseignement Forestier* IREF with assistance from the United States Agency for International Development (USAID). This was based on 1958-1960 aerial photos. FAO completed this inventory in 1970. The inventory covers mostly the northern part of the country, the area east of the Mekong and the Cardamones Mountains. It shows that Kampuchea had about 132,200 sq km of forest land representing 73 percent of its territory (Any land planted with more than 10 percent of trees and bamboo was considered to be forest).

Volume of standing timber. The total volume grossed about 820 million m^3, of which 560 million were trees suitable for saw-mill treatment (having a minimum trunk diameter of 30 cm). National average volume/ha was 66 m^3 (50 percent of forest land had less than 50 m^3/ha, 27 percent between 50 and 100 m^3/ha, 21 percent more than 100 m^3/ha). Annual net growth after losses was about 0.5 percent representing 4 million m^3 of lumber or 0.5 m^3/ha. As a whole, Kampuchean forest has a low productivity.

Gross production. 1967 timber production amounted to 400,000 m^3 to which an unrecorded amount for farmer's self-consumption must be added.

Forest distribution. Percentage of area under forest varied by province:

10-15%:	Takeo, Prey Veng, Svay Rieng, Kandal.
44-75%:	Kompong Chhnang, Kompong Cham, Siem Reap, Kampot, Battambang, Kompong Speu, Kompong Thom, Pursat.
87-94%:	Kratie, Rattanakiri, Koh Kong, Preah Vihear, Stung Treng, Mondulkiri.

The most heavily forested areas were in the north and northeast bordering Viet Nam, Laos and Thailand, and in the southwest near the Cardamones and Elephant mountains.

ii. Production and use

Of the 400,000 m^3 annually produced prior to 1970, 64 percent was industrial wood and 36 percent fuelwood including wood for charcoal. Non-wood products were 363 tonnes of rattan, 47 tonnes of resin, 300,600 litres of wood-oil and 653,300 m^3 of bamboo. Even if farmers' unrecorded felling is considered, forests in Kampuchea would still be classified as undercut. Utilization could have been greatly increased and improved within natural productivity limits.

The Kampuchea woodlands largely met the needs of the country, except for some high quality wood pulp. In rural areas, farmers used timber for all their domestic needs. These included the traditional wooden house, agricultural tools including ploughs, harrows, and cattle-drawn carts, boats, pirogues, furniture and firewood. The extent of the production required for these purposes remained unrecorded. In the cities, firewood was increasingly being replaced by charcoal. About 200 charcoal kilns were located in the Kratie, Kompong Thom and Pursat regions. Despite growing use of concrete and bricks for housing, urban wood consumption for housing, furniture, packing, handicrafts, posts, etc. was still important.

iii. Forest land use

In spite of undercutting, some practices were damaging the natural resources in some regions. These included shifting cultivation practiced by minorities groups, forest fires, and over-exploitation of some species, particularly *Koki* or *Hopea adorata* and *phchek* (or *shorea*

Table II.E.1

FOREST CATEGORIES

Woodland	Characteristics	Percent of Total Forest Area	Standing Volume (million cu. m)	Location
1. Dense	- Rainforest - Moist evergreen forest	32.00	493	Cardamones and Elephant chains. Some higher elev. in northern Kampuchea
2. Dense	Mixed deciduous	19.00		Central areas east of Mekong River
3. Dense	Bamboo	2.95		Near Tonle Sap
4. Open	Including wooded savannah	40.04		Kompong Thom, Stung Treng, Kratie Siem Reap.
5. Flooded		5.15		Near Tonle Sap
6. Open	Coniferous	0.13		Kirirom Plateau, Bokor Mountain
7. Artificial	Teak, traseck, pines	(3,000 ha)		Especially in Kompong Cham

Main Categories of Wood

Category	Characteristics	%	Use
Luxury	Specific wood	2.8	Cabinet work, art, handicraft
First grade	Hard, resistant, dense	33.0	Industrial wood
Second grade		31.2	Carpentry, lumber
Third grade	White and soft	33.0	Packing, panelling

obtusa). In addition, the flooded forest surrounding the Tonle Sap has started to deteriorate despite regulations banning the felling of any trees and forest clearance for agriculture or fisheries. Since the flooded forest is the country's main fish spawning and feeding area, its preservation is economically and ecologically essential.

Forest utilisation. By the end of the 1960s, the Forestry Department had developed a modern forestry code. Forest land was legally owned by the State and could be divided into 2 juridical categories:

- Permanent forest reserves *"domaine reserve permanent"* accounting for 3,350 sq km comprising 174 classified reserves. Forest protection and logging were strictly regulated.

- Protected forest, *"domaine protege"* consisting of all forest land not included in the permanent forest reserves. This land covered about half the country and constituted a reserved land for further farming or pasture development.

Logging concessions were granted through an administrative permit and a licence fee. Because heavy equipment was needed to extract and transport the timber, exploitation tended to be concentrated in a small number of companies. Wood was mostly marketed in the form of rough logs rather than board because the saw-mills were not located near the logging concessions.

Forest by-products. In parallel with this large-scale exploitation of forests, some small-scale exploitation of forest by-products or non-wood products was practised. These products could be divided into:

- Wood by-products. (1) Wood-oil at an average yield per tree of 30 litres. It was used locally or exported in unrefined form. In 1968, about 1,317 tonnes were produced. (2) Wood resin, "Chorchong". Production averaged 125 tonnes. (3) Rough lac with a yearly production of 40/50 tonnes.

- Medicinal plants. (1) *Nux vomica* cropped in small trees in open or flooded forest. Annual average production of 625 tonnes were exported to China and Europe. (2) Seeds of the leprosy tree exported to Saigon and Singapore.

- Others. Honey, wax and cardamom seeds.

iv. Wood industries

Sawmills. In 1967, about 430 mechanized sawmills were located in Kompong Cham and Phnom Penh regions, of which 20 were state-run for administrative and army needs.

Plywood factory. By 1960, with China's assistance, a plywood factory was built at Dey-E on the Mekong. In 1966, production reached 3,900 m^3 of plywood (derived from 8,630 m^3 of logs) of which 860 m^3 were exported.

Wood pulp and paper factories. Established in 1960 in Chhlong on the Mekong, the pulp factory used two raw materials, bamboo and rice straw, and two different processes. Raw material shortages prevented the factory from reaching its designed capacity. The paper factory, located in the same place, processed both local and imported pulp. Production was intended to meet local demand for newsprint, packing paper, writing paper, etc.

v. Export of timber

The character of exports in 1967 and 1968 exports were:

Commodity	1967	1968
Rough logs (m^3)	95,108	95,766
Boards (m^3)	-	7,753
Plywood	-	859
Wood oil	670	1,317
Resin	300	983
Lac	14	35
Nux vomica	377	282
Leprosy tree seeds	14	8.9

b. The 1970s

As a whole, forest regulations were not enforced during this period. All practices were short-term to meet immediate needs even if these were destructive. The result was very large clearings of forest land for farming, firewood or strategic reasons. (Survivors have reported clearing of forest land). Decreases in forest cover ranging from 130,000 to 75,000 ha have been reported. These figures seem high and should be checked by a forest inventory. Among the most destructive practices or war effects were heavy defoliation in border areas, destruction of large portions of flooded forest, and increased shifting cultivation. In addition, most of the country's forestry technicians were either killed or otherwise dispersed. In 1979, the country had only three university level forestry engineers and seven trained forestry technicians. The equipment in the plywood factory's has also been destroyed.

c. The 1980s

Production. National requirements for reconstruction and exports have prompted plans for a rapid expansion of forest production, targeting 200,000 m^3 by 1990. Up to 1989, forest production excluding firewood, has been rapidly recovering. However, total forest cover was considerably reduced during the 1970s and these production increases could reduce the forest regenerative capacity.

Production has risen over the past eight years -- from 19,000 m^3 in 1981 to 127,000 m^3 in 1986 when exports of 20,000 m^3 were recorded. In 1987 output was 167,000 with 30,000 m^3 exported; and in 1988 production exceeded 200,000 and more than 50,000 m^3 were exported. Of this, 20,000 m^3 went to the Soviet Union and Viet Nam, 2,100 m^3 to Czechoslovakia, 1,000 m^3 to Bulgaria and 700 m^3 to the GDR, while some 2,700 m^3 were sold to western countries. Forest products are sold through a state-run organization, KAMFOREXIM.

Forest utilisation. Present forest exploitation is directly undertaken by (1) the Forestry Department, (2) the *krom samakki* (solidarity groups), and (3) through state-run logging concessions. There are four state-run logging yards at Kompong Cham, Stung Treng, Ratanakiri and Mondulkiri with another to be established in Kompong Thom. The *krom samakki* harvest their own logs and provide their own forestry equipment. The Forestry Department provides oil and diesel fuel (5 litres per m^3) at subsidized prices and purchases the krom samakki log output. The price of logs and the level of fuel subsidy is fixed by the Government. The Forestry Department operates its own transport services. Most of the logs (80 percent) are trucked to saw-mills rather than using the river network (20 percent).

Contracts with foreign countries. Kampuchea has negotiated logging concessions with Viet Nam on 75,000 ha in Kratie province. Under a yearly renewable agreement, Viet Nam can harvest yearly up to 130,000 m^3 of timber. Kampuchea receives the proceeds from half of the timber in return for providing only the concession. Viet Nam provides all equipment, labour and transport, including road construction and transport of the whole production. This agreement earned the country US$1 million in 1986, $2 million in 1987, and $3 million in 1988 for a total production of 65,000 m^3. In May 1989, contracts for 6,000 m^3 had been signed with Thai companies. Various Thai companies are seeking logging concessions through individual provincial agreements.

Wood industries. Current policy is to encourage exports of sawn timber rather than logs. The Forestry Department operates 6 saw-mills, a furniture workshop, and some smaller saw-mills in most of the provinces. The State has established a modern mill with automatic Japanese equipment to produce panelling. Total saw-mill capacity is 30,000 m^3 of timber and 1960s production levels may soon be achieved. The plywood factory has not been rehabilitated so far.

Firewood. The above-mentioned production figures exclude firewood and farmers' own-consumption. There are no estimates on how much firewood is consumed each year, either as wood or charcoal, or to what extent firewood collection near densely populated urban areas has reduced the forest's regenerative capacity. The threat seems to be more acute close to the capital. Forestry Department estimates of Phnom Penh's firewood consumption (in m^3) are:

1981	8,000	1984	105,000
1982	82,000	1985	85,000
1983	103,000	1986	103,000

Afforestation and reforestation. Before 1970, the national reforestation programme had been effective since its inception in 1965. 800 ha had been reforested. Similarly, a national company formed in 1964 to fight fires also succeeded in reducing annual damage from 730,000 ha in 1964 to only 339,000 ha in 1965. Afforestation covered 100–200 ha annually. At present, the Forestry Department, rather than focus on those areas recently cleared or cut, is putting emphasis on planting non-forested areas, namely Prey Veng, Kandal, Svay Rieng and Takeo provinces. 1,990 ha were planted between 1986 and 1988 to eucalyptus, acacia and pines. This policy of planting short-cycle trees, for construction and firewood where wood is only available in small quantities, helps it reduce exploitation of the natural forest. But attention needs to be paid to both the large reduction of forest cover during the 1970s, and current rapid exploitation of the country's forest resources which may lead to a loss of regenerative capacity. This situation can still deteriorate so a plan to control forest exploitation must be launched. A start has been made with this: there are now 6 national nurseries in the country; 3.5 million seedlings were planted in 1988.

2. Priorities and Needs

One of the first priorities should be to initiate a new forest inventory, putting emphasis on losses of forest cover during the 1970s, over-exploitation in certain forested areas, the extent of deforestation in the Tonle Sap flooded forest, and watershed management. Actual losses of forest area could be determined by comparing the 1960s and 1980s inventories. Arising from this forest inventory, there should be recommendations on the necessary measures for reforestation and production of forest resources. A fuller statement needs is given under Chapter III.C.1(d).

Other priorities should be control and replanting of the flooded forest, which will have a large impact on fish yields, creation of nurseries network for reforestation purposes; to increase and improve saw-mill capacity; and creation of additional wood-based processing capacity for local and international markets.

F. MINERALS

1. Historical Background

Kampuchea was geologically mapped for the first time in the 1930s by the French *"Service Geologique de l'Indochine"*, for the Geological Map of Indochina at the scale of 1:500,000. The Kampuchea section of this map was superseded by a new map on a scale of 1:200,000, prepared by the Government with French technical assistance during the period 1966–1970. This map, covering the entire country, was issued in a series of one-degree square sheets with a geological explanation.

During the 1960s, several technical assistance projects were aimed at specific mineral exploration. Co-operating countries included France, whose missions investigated a large number of metalliferous prospects including some of bauxite, iron, copper, lead, manganese, molybdenum, tin, zinc and gold, as well as phosphate resources. China surveyed iron, manganese, limestone and coal prospects. A UNDP expert prepared reports on bauxite, kaolin and industrial clays, quartz and limestone deposits.

Few of the above-mentioned surveys were successful in leading to new or increased production, and in the case of metalliferous deposits in particular the results tended to suggest sub-economic dimensions of quality, quantity or both. Certain surveys were, successful, notably, the establishment of large quantities of cement and lime raw materials and the discovery of small but exploitable phosphate deposits.

Apart from those surveys that were brought to a conclusion (positive or negative), a third group remains incomplete, meaning that it is still not known whether production is possible and that further work is therefore needed. This applies notably to lead, zinc and copper prospects, also to bauxite and coal.

In the early 1970s, the following were being mined: clay (for ceramics), dolomite (for glass-making), gold, limestone (for cement), pagodite, phosphate, quartz, sapphire-ruby, silica sand and precious stones (particularly zircon).

It is unsure to what extent this has continued during the war years. A comprehensive review of existing literature, current production, and experience of those in the field during the war years (e.g. Vietnamese and Khmer military officers) is now recommended. Reference to some of the relevant literature is attached as a bibliography to this document, and a project profile for the review is also included.

2. Present Situation

a. Bauxite

Introduction. Bauxite deposits have been investigated (by Cruys 1964 and Carrel 1965-1968) particularly in two areas:

- The limestone hills of northwestern Kampuchea (Battambang);
- The high basalt plateau of Haut Chhlong, eastern Kampuchea.

Considerable research was carried out on these deposits and a study for an aluminum smelter at Kompong Som was prepared by the Mekong Secretariat in 1970. This proposal planned to use power from the proposed Sambor Mekong mainstream hydro-electric project, and was the subject of a pre-feasibility study carried out by Japan.

The bauxites of the Battambang area. The greater part of northwestern Kampuchea is covered by the alluvium of the Tonle Sap basin. This alluvial covering is fairly thin in places, and the underlying bedrock is often exposed. One formation that outcrops more than any other is the limestone group of Permian age which forms numerous isolated hills rising abruptly from the plain, especially in the Battambang and Serei Sophon area west of the Tonle Sap. Carrel gives a figure of 3 million tonnes of known reserves of bauxitic material available for open-cast working. However, since bauxite is very much a bulk-mining proposition, 3 million tonnes is not a large reserve. The quantity of bauxite available for open-cast working in the Battambang area is not likely to be greatly increased by the discovery of new outcrops, so the reserves must be reckoned as very minor.

The exploitation of the bauxite of the Battambang area therefore appears to be inhibited by the following factors:

- the irregular quality of the ore;
- the presence of too much silica, or ferric oxide, or both;
- the apparent metamorphism of some of the ore to diaspore;
- the apparent presence of other impurities, particularly kaolinite;
- the small proven and probable reserves;
- the high dips and structural complexity of the Permian strata, which rule out the possibility of inexpensive open-cast mining operations.

The bauxitic laterites of the Haut Chhlong Plateau. This plateau is situated in the extreme eastern part of Kampuchea and extends over into Viet Nam. The degree to which these basalt plateaux from bauxite depends on weathering under modern and recent climatic conditions. From analysis quoted by Carrel, it would seem that the basalts themselves are exceptionally rich in alumina and poor in silica.

The discovery of bauxitic laterite on the high plateau of Haut Chhlong is significant because such deposits rest on or near the present-day surface. If they have any lateral extent they are readily available for open-cast mining. Yet this work has not been adequately followed up. The analytical results show an overall enrichment of alumina and ferric oxide, and diminution of silica, in the weathering process. Also, where laterite has been located, it has been shown to be bauxitic. A much more systematic programme of mapping, sampling and analysis is therefore needed.

In summary, the bauxites of the Battambang area have been adequately studied and do not present possibilities for exploitation. No further work is therefore to be recommended there. Research into the aluminous soils of the Haut Chhlong plateau, on the other hand, has so far been of a preliminary and superficial nature. A more systematic study of this area is called for, with controlled sampling based on a preliminary study of the geomorphology of the plateau. No other area of Kampuchea is at present known to be of any interest regarding bauxite prospecting.

b. Iron Ore

Phnom Deck, Preah Vihear Province. This is the principal iron-ore prospect known at present. It is situated to the north-centre of the country, at 105° 03'E; 13° 14'N, 15 km southwest of Rovieng and 74 km north of Kompong Thom.

The superficial deposits, which are amenable to open-cast mining, have been known for more than a thousand years, and the ore has been excavated by manual methods at various times in history. Attempts to evaluate and develop the Phnom Deck prospect, by French and Japanese and local concerns never reached the development stage, mainly because of a lack of transport routes and insufficient reserves to justify their construction combined with inadequate local sources of fuel and power.

The primary deposits at Phnom Deck are rather low grade. Estimates put the bulk of the ore at only 51-56 percent iron. The total tonnage is tentatively put at 5 to 6 million tonnes.

Other iron prospects. Many other indications of iron ore are reported from northern Kampuchea, but there is not enough information to assess their significance. Showings have been visited in Kompong Thom and Preah Vihear, Stung Treng and Rattanakiri provinces. Most of these were found to be very small.

In the province of Stung Treng, 3 km east of Chvang, surface debris of iron ore have been reported in an area of ancient micaschists. In the same province, 6 km south of Sam Ang on the Chvang - Thalabarivat path, there is a bed of "banded ironstone" type deposit. In addition, the following iron prospects may be mentioned:

- Phnom Rumdek, Oddar Mean Chey province, 103° 50'E; 14° 05'N;

- Phnom Khbalstung, Siem Reap province, 104° 19'E; 13° 35'N;

- Groupe de Kampot, Takeo province, 104° 40'E; 10° 46'N.

c. Manganese

There are two known manganese prospects. These are both situated near Chhep, in the province of Preah Vihear, in the north-centre of the country. Chhep is 55 km northeast of Rovieng and 70 km west northwest of Stung Treng; its co-ordinates are 105° 25'E and 13° 46'N. The prospects are situated respectively 6 km west and 7 km east north east of Chhep. Reserves are estimated at 60,000 tonnes of ore at each of the two prospects, with 11 to 26 percent of manganese metal (possibly up to 40 percent in some places).

d. Pyrite

There are no known pyrite deposits of any significant size reported, but this may be due to the lack of any special study of this mineral in known occurrences. In 1963-64, a small quantity of sulphur and pyrite was listed among Kampuchea's exports -- 122 tonnes of sulphur and 50 tonnes of pyrite.

e. Tin

Cassiterite was discovered in an area on the eastern side of the Cardamones mountains, in southwestern Kampuchea, in 1964. The tin mineralisation occurs at a locality known as Knong Ay (104° 07'E, 11° 33'W), in the province of Kompong Speu, 95 km west of Phnom Penh. Subsequently intensive prospecting was carried out by France, but no exploitable concentrations of cassiterite had been discovered either in the parent rocks or in the alluvium. This first discovery of tin mineralisation in Kampuchea might point the way to more extensive deposits being found in other geologically favourable areas.

The Knong Ay deposit was considered uneconomic due to limited area and mineral grain size, comparatively less affected by weathering. However, the discovery of tin-bearing granite for the first time was significant, and a careful examination of other granite intrusions was recommended. This would be especially encouraged in the western parts of the country by the recent discoveries of cassiterite that have occurred in adjacent parts of southeast Thailand.

f. Copper

Copper indications occur in two areas: The Rovieng district of Preah Vihear province (north) and the Tonle San valley in Rattanakiri province (northeast). The localities from which copper minerals are reported are Phnom Ker, near Rovieng and the Ban Chai area in the Tonle San valley. In the latter case there is some associated lead mineralisation. The precise locality of the occurrences is in certain cases not known. The question of copper prospects awaits study in the course of future mineral surveys.

g. Lead and Zinc

In the southwest, there is a group of vein-type lead-zinc deposits near Samrong, in Kompong Speu province. Samrong is situated in the upper valley of the Stung (river) Prek Thnot, 110 km west northwest of Phnom Penh, at 103° 55'E; 11° 50'N. The Samrong deposits were worked for a time around the middle of the 19th century, by Chinese miners who dug several open pits. Probably there is a case for additional geochemical soil surveys in this area, which is accessible by road.

Galena has been found in parts of northern and eastern Kampuchea, but for the most part the indications are small or have not been investigated in any detail. One such locality is in the Tonle San valley in the extreme northeastern part of the country, near the village of Ban Chai (107° 15'E; 14° 09'N).

h. Gold

Gold prospects and alluvial workings are found in three regions: the northwest (Oddar Meanchey province), the north-centre (Preah Vihear) and the northeast (Rattanakiri). The official figure for gold output in 1963 was 208 kgs (valued at about US$255,000).

Bo Sup Trup Deposit, Oddar Meanchey. The Bo Sup Trup deposit is near Banteay Chhmar (103° 06'E; 14° 04'N), in the northwestern province of Oddar Meanchey about 25 km northeast of Thmar Puok. The primary gold is in a network of quartz veins which are between 30 cm and 4 m thick. Besides gold, the veins also carry traces of pyrite, sphalerite, galena, chalcopyrite and malachite. There is some silver.

The gold deposits have been worked since at least 1877 by artisanal methods at the surface and from 1905 to 1911 by a private company operating underground. In 1929, it was estimated that there was a reserve of 440,000 tonnes of ore carrying an average of 15 gm of gold per tonne, i.e. 6.6 tonnes of gold metal.

The vein-deposits, surface showings and tailings dumps were the object of a further investigation, including drilling, between 1961 and 1965. Drilling totalled more than 1,000 metres of core. Although some high values were obtained from individual core samples, the overall average grade of the principal group of veins was rather low for an underground exploitation. A study of gold-bearing alluvium in the area showed an extent of some 20 sq km, averaging about 0.5 gm/m^3 Also, there is said to be an artificial lake that could be dredged. Thus the Bo Sup Trup site has potential for renewed mining operations.

Prospects in Rovieng District, Preah Vihear. Three main prospects have been located: (1) Alluvial gold near the village of Phnom Deck; (2) A vein deposit at Rom-Dey, 8 km WNW of Phnom Penh; and (3) Another vein deposit at Phnom Lung, 14 km west of Phnom Penh. All of these deposits have been worked, or are still worked, by artisanal methods, and there has been fairly continuous open-cast mining at Phnom Deck and Phnom Lung since 1956. Total output has been estimated (1962) at about 150 kg of gold per year.

Phnom Deck. This lateritic placer has yielded grains of gold mainly in the size range 0.1 – 3.5 mm. Some rare nuggets weighing up to 150 gm were found. This is now reported to be exhausted, and the primary deposit from which it is derived has not been found.

Rom Dey. The primary deposit is a gold bearing quartz vein 3–90 cm wide containing in addition a little pyrite, chalcopyrite and mispickel. Like the Bo Sup Trup prospect described above, Rom Dey was the subject of an investigation by drilling (over 500 metres of core) during the period 1961–1965. The results were inconclusive. A number of very high values were obtained, with up to 191 gm of gold per tonne in one case, but the wide variations and the small number of samples made a firm estimate of reserves impossible. It was calculated that there were 12,639 tonnes of ore, with reserves of between 90 and 258 kg of gold. Altogether, the results seemed to rule out any systematic exploitation of the deposit underground, but further exploratory work was recommended.

Phnom Lung. This deposit is situated at the eastern foot of the hill known as Phnom Lung, 6 km west of the Rom Dey deposit described above. The gold occurs in a network of quartz veins in aplite and granite of Heronian age. The elluvial and alluvial placers derived from the primary deposit, which average about 20 gm of gold and 1.5 gm of silver per tonne, were actively exploited by artisanal methods, but no production figures are available.

Prospects in Rattanakiri Province. In the valley of the Tonle Sap and its tributaries, there are numerous trace showings of alluvial gold which have been worked by simple panning methods from time to time. There was a prospecting mission launched by a private company as long ago as 1894, which revealed no gold deposits of immediate commercial interest, and was eventually abandoned for lack of capital. Since then, there does not appear to have been any further controlled prospecting.

Bo-Kham. There are auriferous gravels and also gold-bearing quartz veins at Bo-Kham. There was reported to be some panning activity, more or less intermittently, in this area. In northeastern Kampuchea, about 20 km northwest of Voeune Sai (Rattanakiri province) there were reported to be small gold placers. There are also a number of other localities where auriferous veins occur. All of these are in the area of crystalline schists and granitic intrusions of possibly Pre-Cambrian age, in the extreme northeastern corner of the country.

I. Gemstones

For many years there has been an irregular and largely uncontrolled production of precious stones, whose output could undoubtedly be increased by a re-survey of the whole industry and its rationalization under Government control.

Pailin. Pailin is a famous gem centre in the west of the country (Battambang province). The principal gem produced is sapphire, and there is some ruby and zircon. Picotte (spinel) is also obtained. The Pailin sapphire is a beautiful stone, recognized and renowned throughout the world. Individual specimens attain a high gem quality and consequently command top prices. There are two principal gem-producing areas: one around Pailin itself and a second some 22 km to the south (Ban Khbalstung – Samlot). Zircon was the principal stone obtained. Sapphires came mainly from the immediate vicinity of Pailin, while there were more rubies than sapphires in the southern Ban Khbalstung area.

Gemstones have been mined at Pailin since at least 1875. Excavation is by simple manual methods and panning. There was not any significant introduction of systemmatic mechanical methods. Up to about 1912 several thousand workers were permanently employed, but since then operations has been irregular. It has never been possible to ascertain, even approximately, the output of gems from the Pailin field, because the sale of the gems has never been successfully organised into measurable and controllable channels. It is certain that many stones are smuggled out of the country or sold illegally. However, it has been estimated that, before 1945 at least, the production of sapphire and ruby combined was between 2,000 and 5,000 carats per annum.

Bokeo. Bokeo (or Andaung Pich) is situated 33 km northeast of Lomphat, the capital of Rattanakiri province, in the northeast of Kampuchea. The area is a vast basalt plateau covering some 1,500 km^2 The basalt is the parent rock of the gemstones, which are obtained primarily from scattered but extensive elluvial and alluvial deposits. The most widely accepted theory of origin of the gems is the same as for those of Pailin. By far the most common gem at Bokeo is zircon, which often occurs as large crystals of high quality. Sapphire and ruby are comparatively very rare. There are some occurrences of gem-quality garnet and spinel (picotite). Exploitation is exclusively manual, using pans, sieves and hand-operated jigs.

There are several gem-producing districts: Bo Loi, Bo Noac, Bo Tum, etc. In a recent detailed prospection of the deposit at Bo Hei, in the Bokeo district. An area of 31 ha was found to have 1.5 million carats of recoverable zircon, made up of 6,100 kg of gemstones and 19,500 kg of industrial-grade zircon. It was calculated that, under the present system of working, 65 to 85 percent of the zircon was irretrievably lost in rejected ground and tailings. Nearly all the recovered zircon was sold by the kilogramme and only 2.5 percent of the production was cut and sold as individual stones. The official production estimate was about 1,200 to 1,500 kg of zircon per annum (1966), without any indication of value.

Gemstones occurrences in Rovieng District, Preah Vihear Province. There are two locations: Phnom Chnuon (105° 15'E; 13° 26'N) 17 km N.E. of Rovieng, and Phum Thmei (105° 16'E; 13° 38'N) 35 km NNE of Rovieng. Both are elluvial-alluvial deposits in close proximity to, and derived from, small outcrops of gem-bearing Quaternary basalts. An interesting feature of the basalts at Phnom Chnuon is that they also contain nodules of the sodium feldspar, albite. Because of the restricted area of the basalt outcrops, the superficial deposits are themselves of no great extent.

The Phnom Chnuon deposit contains mainly zircons, but a few sapphires have been recorded. There has been sporadic panning of the gravels by local inhabitants. At Phum Thmei, there are two separate occurrences, one 3 km SE of the village and another about 2 km to the west. In these two localities, again sporadically worked by the local people, there are reported to be mainly sapphires, with secondary zircon.

Chamnop (or Chum Neap) is in the Cardamones mountains 70 km east of Khemmark - Phouminville, in Koh Kong province. As elsewhere, the deposits consist of sapphire and zircon bearing elluvials and alluvials derived from basaltic lavas. The deposits are apparently restricted in size and occur only in certain valleys in the heart of the mountains. Excavations by local inhabitants have only come to light by virtue of the appearance in Khemmarak - Phouminville in 1968 of sapphires and zircons obtained from the area. The exact location, extent and potential of the deposits remain to be ascertained.

j. Silica

There is reported to be an exploitation of silica sand on the coast near Tuk Sap (approx. 103° 41'E; 10° 35'N) in Kampot province. This was operated for the state glass factory at Stung Meanchey, which was opened in 1966 with a design capacity of 3,000 tonnes of glass products (mainly bottles) per year. However, we have at present no information about the silica sand deposit or of the quantities being extracted.

k. Limestone for cement

Interest lies exclusively with the areas of Battambang (in the west) and Kampot (in the south). In each of these areas there are numerous steep-sided limestone hills rising abruptly from the plain, most of which are readily accessible from existing roads. Among other localities where limestone exists, Stung Treng in the north may be of future interest, especially if concrete dams are constructed in the region.

Kampuchea's cement industry has concentrated exclusively on the Kampot limestones, which are very conveniently situated on the main Phnom Penh - Kompong Som transport arteries. The first cement plant was inaugurated at Chakrei Ting, near Kampot, in 1964. This is at Km 131 on the road from Phnom Penh. Production in 1967 was 58,000 tonnes against national consumption of about 170,000 tonnes, the remainder being imported. An expansion of the Chakrei Ting plant, started in 1967, was to increase capacity to 110,000 tonnes in 1969. A second cement factory was planned to have a design capacity of some 300,000 tonnes per annum.

The Chakrei Ting plant was sited following an investigation by a team from China, which confirmed a deposit of cement-grade limestone in the vicinity (minimum reserves 9 million tonnes) as well as a clay deposit 8 km away (reserves 813,000 tonnes) suitable as a cement ingredient. The iron and gypsum necessary for cement manufacture were imported, as no suitable indigenous raw materials were found near the plant site.

A second investigation was launched in 1966-67, to evaluate additional limestone and clay raw materials in the Kampot district in view of the expansion of the industry. The target was an additional 50 million tonnes of cement-grade limestone and 10 million tonnes of clay. The mission was able to show reserves of 90 million tonnes of cement-grade limestone on the southeast side of Phnom Laang, a hill 9 km east of the Chakrei Ting factory. As part of the systematic prospection, 69 samples of limestone were analysed and the results showed that no impurity was present in impermissible quantities. In general, the limestone is high in calcium and silica; iron, alumina and sulphate are all low.

I. Clay

A number of investigations of raw materials for the ceramics and cement industries have given much information about individual deposits. It should be noted, however, that the following description is far from complete because there are hundreds of small pottery works all over the country using local clays. No country-wide survey of clay deposits, their quality and use, has ever been undertaken.

Kampong Chhnang. An investigation was made in 1968 of kaolinitic clays in the vicinity of Kompong Chhnang, 91 km from Phnom Penh on the Battambang road. Kompong Chhnang is one of the principal pottery centres. On the east side of the road to Srok Ach Romeas, 2 km south of An Don Srey (Prey Khmer), is a deposit of residual clay derived from an underlying granite. This was worked to supply clay to a ceramics factory at Kompong Chhnang, whose main product is cups (half a million were made each year) for catching tapped rubber. At the place where the clay is obtained, it is slightly spotted with iron oxide stains. This gives the fired product a yellow colour reducing its value as chinaware.

Four kilometres south of Kompong Chhnang, on the road to Srok Ach Romeas, and 300 metres west of the road, there is a deposit of white compact kaolinitic clay (Phnom Trok) containing very little iron. A similar distance on the east side, near the base of a granitic slope, is another occurrence of similar white clay. At Komreng, 60 km west of Kompong Chhnang, there was a small brickworks. This is situated alongside the Phnom Penh - Pursat railway line between Bamnok and Komrong stations.

Prek Kak (Sala Srok Stung Trang). This site is on the banks of the Mekong about 35 km upstream from Kompong Cham. The clay deposits are a thick sequence of ancient alluvium which covers several square kilometres and forms a cliff 30 metres high overlooking the river. The principal bed of clay is over 20 metres thick and consists of white arkosic (feldspathic) clay with some small grains of quartz and fragments of rhyolite.

There was a small brick-works on the bank of the Mekong. An investigation was made in 1967 to see whether sufficient quantities and quality of clay were available for making pottery of the chinaware type. This appeared to be the case, from the on-site survey, but results of chemical tests were to be the basis of a decision whether or not to open a quarry and screening plant for preparing the clay for shipping.

"Pagodite" clays of Trasey District, Pursat. In view of the apparent lack of high-grade kaolin deposits, an investigation was undertaken in 1967 of the so-called "pagodite" deposit of Trasey, which has been worked for many years as an ornamental and sculpture stone. The survey found that in certain sectors of the ceramics industry, the pagodite could serve as china clay. An admixture of a certain alluvial white clay would provide the plasticity which the pagodite lacks. The pagodite would ensure an adequate alumina content in the mixed clay.

Trasey is a remote hamlet about 110 km south of Pursat, and the deposits are grouped 3 to 4 km west of the village. The present isolation creates a major problem in exploiting the pagodite. But the likelihood in the 1970s of logging roads having being constructed there would have provided the necessary access.

The most accessible of the deposits was investigated in detail and found to have reserves adequate for both sculpture and ceramic use for several decades. The distribution of pagodite suitable for statuary and for ceramics was adequately determined. The other deposits in the area, being less accessible, were not examined in detail.

Clay for cement - Phnom Sar (Phum Trapeang Sala). The clay pit of Phnom Sar is situated east of the main Phnom Penh - Kampot road, at Km 141.5. It is 7.5 km from the cement works at Chakrel Ting, which it supplied with clay. The clay deposit was surveyed and tested by a mission from China in the early 1960s and a 12 ha concession was granted to the cement company, comprising a calculated 813,000 tonnes of clay suitable for its purposes. The clay is 5 m thick. Up to the end of 1967, about 100,000 tonnes had been removed. Because of limited reserves, a UNDP-assisted investigation was carried out in 1967, and was able to extend the known area of the clay deposit to 30 hectares. It was also found that in places the thickness of utilisable clay might exceed 10 metres so that a partial calculation over seven 40,000 m^2 blocks gave proven reserves of 2.1 million m^3 of clay. Assuming an overall specific gravity of 2.6, this would be about 5.5 million tonnes, representing adequate reserves for many years.

Bauxitic Clays - Haut Chhlong. These are clays derived from basaltic lavas, especially the ash and tuff types on the Haut Chhlong plateau near Senmonorom, in Mondulkiri province. They are also of interest as a potential source of aluminum. These bauxitic clays also have potential uses for refractory materials.

3. Development Needs

It is clear from the above summary that there are a number of mineral prospects that are worth following up by further work; for example, the Haut Chhlong bauxite, Preah Vihear gold, Battambang and Kampot limestones. A thorough review of the literature is needed to identify future prospects in these and other areas. This should be undertaken by a specialist mission whose task would also be to draw up project documents or agreements whereby work on promising prospects is taken a stage further by field reconnaissance.

Such a mission should also review the institutional capabilities to undertake geological surveys in the country, about which very little is known; and make appropriate recommendations to upgrade the departments concerned.

Notes to Chapter II.A-F

1. These are described in detail in the Chapter II.E below.
2. Kampuchea: Report of the FAO/WFP/UN Mission OSRO, Report No. 02/881E.
3. This account of the hydrology of the Mekong system has been inserted with the tex to assist in the understanding of Kampuchean agriculture. It is complementary to the account in Chapter IV.A, which described these phenomena in a more general sense.
4. Compagnie des Caoutchoucs du Mekong.
5. Societe des Caoutchoucs de Kompong Thom.
6. Societe des Plantations de Kratie.

III. Manufacturing Industries

A. GENERAL DEVELOPMENTS

a. The 1950s and 1960s

Following its 1953 independence from France, Cambodia vigorously promoted State enterprise -- increasingly so in the 1960s and in several cases with Chinese and Czech credits and equipment. Nevertheless, this ownership form accounted for only 7 percent of manufacturing value added (MVA) in 1966, up from 3 percent in 1963. Private unincorporated enterprises were responsible for the majority of MVA -- 63 percent in 1963 and still 59 percent in 1966 -- while the share of private and mixed corporations remained at 34 percent. The vital force in Cambodia's industrialization continued to comprise ethnic minorities who formed the core of the entrepreneurial class.

This picture would have changed in subsequent years, however, due to the State's much larger share of investment in new capacity before and during the mid-'sixties. It had become an important force in textiles, saw milling and plywood, paper, cement, glass, sugar, rubber, tractor assembly, fish processing, distilling and brewing. In several of these industries the State enjoyed a monopoly position, while in others public firms were favoured by controls on prices of both raw materials and output. Such discrimination against private manufacturers was reinforced in 1963 by the nationalization of the banking system, which thereafter directed credit largely towards State firms. Policy changes which would have liberalized the environment were announced at the end of the 1960s, but their implementation was interrupted by the war.

Another feature of the 1960s was diversification away from the food processing and beverage industries, which were contributing over a third of MVA but accounting for less than a tenth of new investment. During the 1956-68 period the bulk of investment was made in light engineering, assembly and repairs (together 39 percent), followed by textiles, rubber, chemicals and paper. An attempt was being made at geographic diversity as well, although Phnom Penh continued to account for most larger undertakings in the 1960s. This pattern might have altered in subsequent years due to the free zone and other infrastructural facilities being established at the port of Kompong Som (then Sihanoukville), but the latter's viability as an export oriented industrial growth pole had not been established. Other areas with industrial activity outside the capital were Battambang (mainly rice and saw milling), Kompong Cham (tobacco drying and more saw milling), Prey Veng and Kompong Thom.

b. The 1970s

At the end of the 1960s Cambodia appeared set for both expansion and improved efficiency of the manufacturing sector. The Government had drawn up an ambitious investment plan for further State involvement and, more important, it seemed to be in the process of deciding to return to the more liberal policies of the 1950s and early '60s in order to encourage private, including foreign investment. The resumption of United States aid was under consideration, the World Bank had been invited to consider providing support, and there seemed to be scope for Cambodia to share in the expansion of Japanese overseas investment which was becoming increasingly important in neighbouring Southeast Asian economies.

In the event, however, little new activity occurred during the 1970-75 period, and much of the existing industrial capacity was destroyed by bombing and other forms of war damage. When the United States bombing of Cambodian territory (aimed at interdicting North Vietnamese support for the revolutionary forces in South Vietnam) ceased in 1973, the Khmer Republic Government produced a comprehensive *Plan de Reconstruction et de Developpment Industriel, 1973-1980* which constituted a blueprint for repairing the damage and making modern industry a key growth sector. The plan projected the country's consumption of

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industrial goods through the rest of the decade, and proposed the creation of 37,000 new jobs (mainly in new enterprises), the improvement of productivity by 3 percent a year, and the maintenance of a 10 percent annual rate of growth for industrial output. Part of the substantial investment was to have been funded by claimed compensation from the US.

No significant implementation of this ambitious plan could occur in 1974-75, since the Khmer Republic was rapidly losing control of large areas of the country. And it was abandoned altogether with the establishment of Democratic Kampuchea in 1975. Indeed, further destruction, along with widespread neglect and abandonment, set the manufacturing sector further back during 1975-78, notwithstanding the new spurt given to certain industrial activities in a drive for self sufficiency by the Khmer Rouge authorities.

Table III.1

STATE ENTERPRISES IN THE 1960s

(Amounts in million riel)

Enterprise		Location	Sponsor /year	Share capital		Persons employed
				Govt	Prvt	
SONACIMENT		Kampot	China 56-60	528.2		760
SONATEX	1/	K. Cham 6/	China 56-60	297.8		1800
SONAPNEU	2/		Czech. 61	198.0		340
SKD		several 7/	Govt 60/63	150.0		1000
VER.D'ETAT	2/		China 63	125.0		450
SOKJUTE		Battambg	Govt 64	120.0		787
SONAPAP		Chilong	China 56-60	118.0		625
SONACO		Dey Eth	China 56-60	96.4		300
SONASUCRE	1/	K. Tram	Czech. 61	92.7		960
SONATRAC	3/		Czech. 61	47.1		177
SONAC	4/		Govt 64	22.9		115
SONEF	5/		Govt 65	22.0		41
SONASCIE			Govt 64	11.0		300
SONACOP		Koh Kong	Govt 68	24.0		n.a.
SONEXPIEROR			Govt 68	10.0		n.a.
ENAPHAR			Govt 65	30.0		230
Subtotal State Enterprises				1829.1	0	7655
SKRP			67	142.6	77.4	150
SOKILAIT			Aus/Den 68	10.0	40.0	n.a.
MAC				9.4	35.6	340
SOKOA			60	13.5	4.5	34
SOKPHOS		Kampot	63	10.2	1.8	180
Total State & Mixed Enterprises				3907.9	159.3	16244

1/ = excludes 1967 n.a. 2/ = commenced 1967. 3/ = commenced 1966. 4/ = excludes 1967-68 n.a. 5/ = commenced 1965. 6/ = SONATEX had a second gin/spinning mill at Battambang and two weaving mills. 7/ = SKD plants made beer, orange juice, soft drinks and perfumes.

Source: World Bank, op cit (enterprise statutes & accounts).

It is difficult now to assess the extent (and impossible to estimate the viability) of the highly politicized industrial initiatives that were taken during the DK period. On the one hand, records were not kept, unconventional production methods were used in the absence of competent technical personnel, labour was moved around arbitrarily, and overall management was disorganized, especially after purges in the Ministry of Industry. On the other, much of the reorganized and new capacity was again destroyed during and in the aftermath of the Vietnamese military intervention, Khmer Rouge "scorched earth" retreat, and subsequent anarchy before the new order was put in place in 1979-80.

Published reports on the situation before this destruction appear to be restricted to notes on a few closely supervised trips by Prince Norodom Sihanouk (in Chroniques de guerre... et d'espoire, Hatchette, Paris), the evidence of subsequent refugees, and some official DK bulletins and statements which were aimed at raising political consciousness. Only one attempt at an objective assessment of the manufacturing sector has been made (Martin, Marie-Alexandrine, *"L'Industrie dans le Kampuchea democratique (1975-1978)"* in *Etudes rurales, Janv.-sept. 1983*).

It is clear, however, that very large numbers of people -- perhaps three times the 110,000 industrial workers in 1967 -- were harnessed in the Khmer Rouge's industrial effort. This comprised the continuation of activities producing staples such as salt and dried fish, the expansion of some existing factories, the conversion of others to more basic lines of production, and the establishment of some new units. A common feature was the grouping of machines found in abandoned small establishment to form large, labour intensive State factories. The objectives appear to have been restricted to the State's provision of goods needed by an agrarian peasant society: phosphate fertilizer, water transport equipment, agricultural tools, crop processing machinery, and clothing. The greatest expansion appears to have occurred in the engineering subsector, especially barges and hand tools, but textiles may have remained the largest generator of added value.

c. The present regime

When the new Government was formed in Phnom Penh at the beginning of 1979, a large proportion of both the pre-1975 and the Khmer Rouge industrial capacity had been either destroyed beyond repair or rendered inoperable by destruction and looting. In some cases, however, the machinery had been left intact, and in a few there were large stocks of raw materials on hand, ignored by the previous regime. Yet other production units could be resuscitated once missing equipment was rediscovered and moved from other locations.

Two types of initiative occurred to revive industrial activity in the first few years of this decade. On the one hand, the small-scale and artisanal sectors gradually re-emerged as the population was released from work gangs; on the other, the Ministry of Industry was charged with reactivating those medium and large establishments where production was possible. A third approach which emerged fairly soon was the operation of industry by provincial authorities. And a fourth which is now being commenced comprises the encouragement of joint ventures and even 100 percent foreign entities to take over State enterprises, to lease their facilities, or to establish new ones.

The annual growth rate of the Ministry of Industry factories' output has averaged almost 14 percent during the 1980s, but this average disguises violent swings in the 1979-83 period and a fairly steady decline since then, due partly to the transfer of activities to the private sector. Taking 1979 as an index base of 100, the output indices for the succeeding years were calculated by the Ministry of Industry as follows:

1980 : 152	1983 : 166	1986 : 133
1981 : 104	1984 : 143	1987 : 132
1982 : 98	1885 : 149	1988 : 114

The following Section B describes the background and recent developments in each industry group, classified into

- food, beverages and tobacco,
- fibres and forest products,
- mineral and chemical products and
- metals and engineering,

while Section C outlines current prospects and some elements of a recovery and development strategy for the manufacturing sector.

B. INDUSTRY GROUPS

1. Food, Beverages and Tobacco

a. Sugar

Brown sugar was being produced from palm by 35 private small-scale mills through the 1950s and early '60s, partly for export, but contraction of both the domestic and the export markets for unrefined sugar led to the establishment of the State-owned SONASUCRE with Czech assistance in 1964. This refinery could commence operations only after additional facilities had been built to concentrate the sacharose content; meanwhile export of brown sugar to (then South) Vietnam had resumed, leaving little local raw material for the refinery.

In 1967-69 it was producing about 12,000 tonnes a year to serve about 60 percent of domestic demand, but was using mainly imported brown sugar. Distribution was through the State-owned MAGETAT at fixed prices. The share of local production was expected to rise to 80 percent (16,000 tonnes) in 1970, but the refinery's production cost would still be well above that of imports.

The refinery was completely destroyed during the 1970s. Since then, the production of brown sugar has been resumed by several private facilities and by a State enterprise using the former Ajinomoto factory at Chak Angre near Phnom Penh. (Another monosodium glutamate factory, at Chrui Changvar, has yet to be restored.) One hundred workers are reported to produce 200 tonnes a year of good quality brown sugar which is used in the State's two soft-drink plants operated by l'Usine d'Orangeade. Some of the small-scale private concerns further refine the palm product to white sugar.

In the early 1970s SONASUCRE had established another refinery, at Kampong Kol, to make sugar from cane. Its annual sugar production was intended to be 12,000 tonnes, using 150,000 tonnes of cane grown on 3000 ha of newly established cane fields, half to be cultivated by the company and half by 500 families. By-products of the refinery were expected to be used in two other proposed new industries: animal feed and distilling. However, unless cane yields could have been increased well above the 40 tonnes/ha then being achieved in the vicinity, the new enterprise was not expected to be profitable without considerable protection. This refinery also was destroyed later in the 1970s, but it is now being repaired with the help of some spare parts from the old SONASUCRE plant. Meanwhile, as with palm sugar, there are numerous small-scale operations to process cane. One of these, in Battambang, comprises a mobile unit provided by CIDSE, which has also supplied seeds to stimulate cane growing.

b. Vegetable oils and starch

One modern refinery in Phnom Penh and 15 other small-scale mills produced about 10,000 tonnes in 1969, meeting most of the country's unsophisticated domestic demand for vegetable oil. A newer mill established in the early 1970s on the then Chief of State's 1,000 ha coconut plantation in Kompong Som to produce oil from its own and local copra surpluses was completely destroyed later in the decade. The Phnom Penh mill, established privately in the 1960s to extract oil from rice bran, is now being operated by the State to produce oil as inputs for soap production and textile treatment. The Government is now reportedly planning to restore this plant's other production line, a facility for producing edible oil.

Rice bran is also a major raw material (along with fish and shells) for two plants currently producing animal feed -- operated by the veterinary departments of the Ministry of Agriculture and Phnom Penh City. In addition, coconut oil is being produced in several provincial plants (including, prospectively, Kompong Som) and oil is being extracted from rubber fruit in at least one province. Some of these initiatives have received support from MCC, notably copra for soap making in Chak Angre (Phnom Penh), copra and castor oil production for soap in Battambang, copra and rubber fruit for soap in Kompong Cham, and mills to process coconut oil in Kampot and Takeo. In addition, CIDSE has promoted castor seed growing in Battambang. Unfortunately, extraction of oil from copra is not viable at present prices: 20 coconuts are reported to cost 150 riel but yield oil worth only 65 riel.

A much larger venture, capable of producing 15,000 tonnes of refined oil for annual export -- with by-products available for a proposed State animal feed plant -- was being proposed by the then Government for establishment in the early 1970s but was never realized. Its raw materials were intended to be cotton seed, ground nuts, kapok and corn, but the World Bank mission suggested that the study of its feasibility should also include consideration of coconut developments which were being proposed at that time on the Koh Kong coast.

Another planned industry based on corn which did not come about in the 1970s was starch production for export (with by-products for the same proposed animal feed production). This was not expected to be profitable on the envisaged scale: 90,000 tonnes a year to be produced in a Kampong Som plant from 150,000 tonnes of corn. More important, it could have been implemented only if corn production could have recovered from its low level of 150,000 tonnes in 1969 (compared to 204,000 tonnes five years earlier) and expanded further without displacing more profitable crops such as beans,

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other vegetables, ground nuts and manioc. Since then corn production has fallen further, amounting to only 49,000 tonnes in 1986. Either a thorough economic study of land use potential or several years of free market conditions to establish economic production patterns would be required before the viability of these oil and starch export and animal feed industries could be estimated.

c. Other grain and soya products

In 1969 there were around 1500 small-scale rice mills located in villages throughout Cambodia's paddy areas, but few modern mills (an exception being an automatic mill at Battambang). The use of small mills inhibited exploitation of oil from the bran and other by-products, and reduced both the quantity and value of the milled rice which at that time was a significant export commodity. The 1970 World Bank report included a proposal to explore the scope for establishing more modern mills to husk the export rice immediately prior to shipment and to extract by-products. The export consideration does not apply at present but could in future. Meanwhile milling is undertaken by 5-20 ton/day mills in many districts and 200 ton/day facilities at the provincial level (with two or three such units in large provinces). Much of this equipment was imported from Japan in the 1960s.

Rice-based noodles and related products were produced in 17 small-scale factories at the end of the 1960's but now most production is at the artisanal level. Apart from rice and perhaps one miller of manioc, most other flour is imported. In 1969 a private Khmer group was studying the possibility of establishing a mill at Kompong Som to convert imported wheat. This did not occur, but a mill at Phnom Penh began operations in the early 1970s. It escaped destruction later in the decade but its use at present is inhibited by lack of spare parts; it is reported to have produced 55 tonnes in 1987 and 510 tonnes in 1988. There were 14 bakeries and confectionary producers adequately meeting domestic demand in the 1960s and such establishments have emerged again on a small-scale.

More than 40 firms were producing soya-based condiments on an industrial or semi-industrial scale, but this industry also is now mainly artisanal. There are as yet no plans to utilize soya for other purposes such as combining with cow's milk to improve the latter's digestibility.

d. Salt

Salt production is a traditional industry of Kampot province, and is now operating well. Support in the form of bags has been received from LWS.

e. Fish processing

Important artisanal processing of Tonle Sap freshwater fish to make condiments occurs on a seasonal basis, undertaken by many groups which visit the riverine area north-west of Phnom Penh for a few weeks each year. Lake fish also are used to make paste (*prahok*) and sauce (*tuk trey*) in jars and jerry cans; there were 63 small-scale units engaged in this business in Kampot province in the late 1960s but there may be fewer now. There were also one factory at Chak Angre and three smaller units which processed vegetables and meat as well as fish at that time; the Chak Angre facility is now being operated by the Department of Fisheries. The latter also operates a cold storage facility in Phnom Penh which, inter alia, freezes freshwater shrimp for export. This facility was established in 1987 with Japanese and French refrigeration equipment, and is now being expanded.

Sea fish also are used for making *tuk trey* but the catch off Kompong Som is more significantly used for sale as fish; to serve the Phnom Penh market they are transported by refrigerated truck to the above-mentioned cold storage facility. In the late 1960s a State-owned enterprise, SONACOP, established a plant to use the abundant fish caught off Koh Kong to produce both canned fish and fish meal. The latter was intended as an input to the proposed animal feed factory which was not implemented. The SONACOP plant was destroyed in the 1970s and its rehabilitation has yet to be completed; it is intended to produce *tuk trey* in powder form and fishmeal for animal feed. As noted in Chapter II.D above, Khmer fishing off Koh Kong is now less significant than the activities of Thai fishing fleets to which the Cambodian authorities issue daily permits. Potential supply to the rehabilitated plant could be adequate, however.

An important crustacean initiative in the 1960s was a French venture to organize fishing on an industrial basis and to freeze crustaceans for export in a Kampong Som factory. The latter was constructed behind the SKD brewery, but the plant was destroyed later in the decade and the building is now used for fisheries administration. Its original idea has been revived recently, however, and the Government is discussing with a French company the establishment of a prefabricated unit on the beach nearby to freeze shrimp for export. In the 1960s SONACOP also was planning a plant to freeze and export shrimp; this was never implemented but its purpose is now being partially served by the Phnom Penh cold store and the Ricoffi initiative.

f. Milk processing

A 1960s FAO-assisted dairy project at Stung Meanchey on the outskirts of Phnom Penh promoted smallholder cow ownership and began a pilot plant in 1969 to collect fresh milk from local farmers and combine it with reconstituted skim milk imports, for provision to city residents in pasteurised, homogenised form. Production was expected to reach 2,000 litres a day. The dairy was destroyed in the 1970s, but the Government has begun to restore it and hopes to recommence the milk cow promotion programme.

Also in the late 1960s, SOKILAIT, a joint venture of the Australian Dairy Board and the Danish firm Comin Khmer had been formed with 20 percent State participation (through MAGETAT) to produce concentrated milk from imported powder and dissolved fats. Production was intended to begin in 1970 under a Government policy to ban imports once SOKILAIT could satisfy local demand. The plant ceased production in the late 1970s, but damage was not great. Neither of the foreign partners has expressed interest in resuming their involvement, but the Ministry of Industry has reactivated production on a small scale -- two or three days a month as permitted by the availability of imported powder. It is understood that a contract is now being negotiated with an expatriate Khmer who proposes to lease the plant from the State and operate it as a private enterprise, and that a French company has expressed interest in establishing a new facility.

g. Other beverages

The State-owned brewing, distilling, juice and perfume producer and distributer, SKD, was established in 1960 with a monopoly for alcoholic drinks. In the 1960s it commenced operations at several locations. SKD was the State's second largest commercial employer with 1000 workers in 1969. It was also its most profitable enterprise, although only 6 percent of the 400 million riels of profit it earned in the 1964-68 period was paid to the Government. Its production of liquor was distributed through private wholesalers and retailers as well as SKD's own shops, but only those shops could sell imported liquor. Juice and beer, on the other hand, were distributed privately.

Total production of pure alcohol based on rice, corn or sugar was 75,000 hl in 1968, including the output of SKD's own distillery (which had been built in 1929) and of a few small private companies which could sell only to SKD. A thwarted development would have seen the establishment of a new SKD distillery to produce an extra 3,000 hl of alcohol, partly for export and partly to replace rum imports; this would have utilized the molasses by-product of a planned second sugar refinery at Kampong Kol which otherwise may have been discharged to pollute the Stung Sangker river. The old distillery has now been reactivated by the Ministry of Industry, although about 20 percent of its equipment is not operating; its 1988 production is reported to have comprised 2 million bottles of liquor, almost 3 million litres of white liquor and almost 60,000 litres of alcohol.

SKD's orange juice production commenced in 1967 to absorb agricultural surpluses; output was 1.5 million bottles in 1969 and it was expected to reach 5 million in 1972. The plant has not been operated since the mid-1970s when a large proportion of the country's orange trees were destroyed under zealous execution of a policy to concentrate on rice production.

In the late 1960s the market for softdrinks amounted to 75,000 hl a year. About 90 percent of that market was supplied by three private companies, while 125 small producers accounted for the balance. Two of the formerly private Phnom Penh factories, Pepsi at Km-6 and BGI near the Palace, are now back in production under the name of *l'Usine d'Orangeade*, controlled by the Ministry of Industry. Several provinces also have bottling plants producing soda water and other carbonated beverages.

The country's beer demand was met partly by an old BGI brewery in Phnom Penh and partly by imports until 1968 when SKD's new brewery commenced operations with Czech technology at Kompong Som (as the only significant industry in the new port); the expected 1969 production level was still less than the country's beer consumption at that time, however. SKD planned to use the carbonated gases of the brewery to make soda and other beverages, but this was never effected. The brewery's equipment was badly damaged in the late 1970's and production has not yet resumed. This would be facilitated by access to the mechanical and process specifications known to the foreign firm which was involved in its establishment; meanwhile it is understood that a Thai brewery may invest in the rehabilitation.

h. Ice

Each province has its own ice making facilities. The output of the the Phnom Penh plant operated by the Ministry of Industry was reported to be 36,500 tonnes in 1987 and 14,300 tonnes in 1988.

i. Tobacco products

The industrial segment of tobacco processing formerly and again now comprises three establishments, dominated by MAC, which used to be a mixed enterprise with 20 percent State participation. The three firms' cigarette production in the 1960s approached 4000 tonnes a year, about a fifth of which was exported to Vietnam. In addition, there were about 160 small drying ovens which provided the raw material to roadside makers and sellers of coarse cigarettes. The three industries are now operating successfully under new names -- Liberation, 7 January and National -- but their product is sold in soft packs pending rehabilitation of the packaging machinery. The Ministry of Industry has reported their 1988 production as 144 million sticks.

2. Fibres and Forest Products

a. Cotton textiles

Most cotton grown in Cambodia is short fibre. During the 1960s the Ministry of Agriculture was experimenting with long fibre production but this programme ceased in the 1970s and has only recently been recommenced on a small-scale. During this decade the re-establishment of small-scale growing of short-fibre cotton plantations has been encouraged by the Government (with assistance in the form of seeds from CIDSE in Battambang province). In the meantime, the country's weaving industry remains largely dependent on imported thread from the USSR.

The country has two industrial gins, which are integrated with spinning operations at Battambang and Kampong Cham established with Chinese assistance in the 1950s. Then operated by the State-owned SONATEX, these mills together had 25,000 spindles. (Although SONATEX comprised Cambodia's largest industrial enterprise with 1800 employees, it was barely profitable during the 1964-68 period, returning only 1 percent a year on the Government's investment.)

Textiles was one of the industries which were pursued in the 1975-78 period -- indeed, new Chinese machinery was installed at the Kampong Cham facility -- and much of the SONATEX equipment was intact at the beginning of the 1980s. The mills are now operated by the respective provincial authorities and are increasingly using local cotton after relying on imports from the USSR and Japan pending the recovery of local production.

SONATEX also used to operate two weaving mills with combined annual output of up to 9 million m^2. In addition there were four large, privately owned weaving mills in the Phnom Penh vicinity, and about 60 small-scale establishments. These firms obtained about half their yarn requirements from SONATEX and imported the rest. Some of the firms had dyeing and finishing facilities which served the other weavers. Three other firms were making fishing nets from both cotton and nylon. About 20 small-scale units were producing knitwear, mainly underwear and hosiery, and one made medical goods, namely absorbent cotton wool and dressing material.

In the late 1960s the then Government was planning an integrated textile project comprising a mixed enterprise with local and foreign private participation. This was intended to: spin the prospective long fibre cotton, together with synthetic fibre from imported raw material; weave cloth for suitings and lingerie; and include a modern dyeing and finishing facility. The feasibility of such a venture was not established at that time and no recent effort has been made to revive the proposal.

Both during 1975-78 and in the early 1980s the looms and other equipment of the various Phnom Penh operations were moved around. At the present time the location of the serviceable looms has been rationalized into seven Ministry of Industry units according to machine type and function:

- five of them have dyeing facilities (as does the Kampong Cham mill which has received assistance from Oxfam);
- printing equipment has been acquired from Japan to expand capacity in this regard.
- unit no. 2 has both weaving and knitting machinery (though the latter lacks needles at present);
- unit no. 5 includes equipment for medical dressings, which has been assisted by WCC;
- unit no. 6 contains the equipment consolidated in 1975-78 for making blankets and towels;
- unit no. 7 specializes in sewing thread, shoe laces and prospectively zippers (when spare parts are available); and
- two of the units have capacity to process synthetic yarn which is not being utilized pending rehabilitation.

Production in 1988 at the above Ministry of Industry facilities (i.e. excluding the Kampong Cham and Battambang mills and a small one at Kampot) was reported to have a wholesale value of 255 million riels, with a 38 percent increase expected in the present year. The 1988 production, which included 2.5 million multi-purpose scarves (*kroma*), 2.4 million metres of mosquito netting, 1.2 million metres of cloth and 103,000 blankets, was insufficient to meet domestic requirements, even when supplemented by small-scale private and cooperative operations. A few of these have received external assistance, notably CIDSE help for kroma production in Battambang province. Another important programme in the textile sector has been UNICEF's provision of sewing supplies for artisanal units in 11 provinces.

b. Silk

Silk weaving and the production of Khmer *sampots* and sarongs is a traditional artisanal activity with good prospects for expansion as an adjunct to tourism. Its recovery has been promoted by the Phnom Penh authorities, with assistance under the above-mentioned UNICEF programme as well as CIDSE support for a Takeo Women's Association weaving project and a study tour to India arranged by WCC.

In the past some silk thread was produced locally (for religious reasons, by Vietnamese) but most of the raw material was imported from Japan and China. Mulberry tree cultivation has been commenced recently on a small scale in the Takeo and Battambang provinces; this activity could be expanded easily, but religious considerations would still inhibit the extraction of silk from the cocoons.

c. Jute

Until the mid-1960s jute production was limited to smallholders, mainly in the Battambang area, whose combined output of 160 tonnes in 1965 was used for string, hammocks, etc. but not sacks which were imported. Then the State-owned SOKJUTE was established and by 1969 its promotional and purchasing activities had caused production of jute and kenaf to expand to six provinces and rise to 6,000 tonnes with the prospect of 21,000 tonnes 10 years later. Its mill began operating at Daunteav in Battambang province in 1967 and a year later was employing almost 800 people and producing at full capacity. Its output comprised five million sacks (about 40 percent of the domestic requirement, including for export rice, at that time), with 300 tonnes of string and 400,000 m of canvas as by-products. SOKJUTE paid high prices to farmers, causing its sacks to cost about 30 percent more than imports.

Plans were being laid at that time to establish a second mill which would have produced 10 million sacks. The 1970 World Bank report noted that the feasibility of this proposal would depend on several conditions including:
- the expansion of rice exports;
- the scope for exporting sacks in the event of a rice crop failure;
- the possibility of cheaper synthetic substitutes and/or containerisation for transporting rice; and
- the availability of inputs, irrigation and other infrastructure to sustain a further large expansion of jute and kenaf cultivation.

Early in the 1980s, restoration of the jute plantations began in Battambang with CIDSE assistance in the provision of seeds and transport. Since then production has been extended to Pursat and other provinces around the Tonle Sap lake. The crop price is contracted between the mill and the growers, and again favours the latter in order to stimulate production. The mill was restored with help from Oxfam and annual production has reached three million sacks. Further expansion is expected, presumably to five million, and a duplicate mill is planned so total output should reach 10 million sacks. Until recently the sack price was set by the Government but the mill's management is now autonomous.

d. Pulp and paper

The State-owned SONAPAP pulp and paper mill at Chhlong, Kratie, was established with Chinese assistance in the 1950s. Its annual output of around 4000 tonnes served only one-third of the domestic market in 1969, and only a third of its input requirements were sourced locally, comprising rice straw and bamboo. Distribution in the 1960s was undertaken by another State firm, SONPRIM, and prices were fixed. Some paper conversion was done by small-scale establishments which, together with printers and publishers numbered over 100.

Domestic paper demand was projected to reach 15,000 tonnes by 1972 and the Government in the late 1960s began planning additional capacity, either:
- a new facility to produce pulp, initially 5,000 and later 20,000 tonnes, for the Chhlong mill and for producing newsprint and kraft paper; or
- the establishment at Kampong Som of an export-oriented plant of sufficient scale to be internationally competitive, i.e. 100,000 tonnes.

The latter would have been based on a mixture of long-fibre pulp imported from Siberia (then in over-supply) and short-fibre pulp made from the rubber wood which would be generated by the renewal of old plantations. Such a plant would have served both domestic needs and the regional export market, and might have been more viable if situated on the Mekong near the rubber trees. Revival of the idea at this stage would require a careful study of the international market as well as of the technical problems of pulping rubber wood.

While neither of the above proposals were implemented, a new mill to make writing paper from purchased pulp was established by a private investor at Chak Angre in the early 1970s. This became the country's only facility when the Chhlong mill was destroyed by bombing, but it in turn suffered damage later in the decade. Since then it has been restored with help from the Belgian FDC and it now produces writing paper from local scrap and imported pulp. The country continues to import both kraft and newsprint.

The conversion branch of the industry has been reactivated also: the Chak Angre plant converts kraft into cartonnes and wrapping paper, and makes exercise books, while the latter and other products are made also by many artisanal units.

e. Crepe and rubber goods

Rubber had traditionally been a major Cambodian export and, as noted in Chapter II.C above, the present authorities have placed high priority on the recovery of this resource after the area being tapped fell from 47,500 to 5,000 ha during the 1970s. The three State plantation companies operate five crepe processing factories -- the Russey Keo unit near Phnom Penh and four units in Kompong Cham province (at Chup, Beng Ket, Memot and Chamkar Andong, the last being a new plant established with GDR support). Their collective output of crepe reached 27,403 tonnes in 1988, representing a recovery to more than half of the country's annual production during the 1960s. Most of the dried rubber is exported: 97 percent of output in 1988 to earn about US$24 million. The main markets until now have been the USSR (which has assisted the rehabilitation programme) and other Socialist countries, but merchants from Japan, Singapore and Hongkong entered the market in 1988 and there are prospects of further diversification this year.

SONAPNEU, a State-owned enterprise set up with Czech assistance in 1961 to undertake the further processing of the country's abundant rubber, commenced in 1967 both the subsidized production of tyres for cars, trucks, motorcycles and tractors, and the monopoly distribution of imported tyres. Its production was 600 tonnes in 1968, when two-thirds of its revenue was derived from imports. Meanwhile bicycle tyres were being made by three private firms, while two others and numerous artisans were engaged in retreading. About 20 further enterprises and many artisans were producing other rubber products such as shoe soles, pipe, and rice mill rolls, and SONAPNEU was considering the scope for producing rubber floor tiles.

The SONAPNEU tyre factory was destroyed in the late 1970s but the production of truck tyres resumed quickly in 1979 since there were adequate stocks of natural rubber to enable operations to begin when the factory was restored in 1980 with parts acquired under a Czech credit. Synthetic rubber and chemicals have been imported under barter arrangements, and tapping was recommenced to provide continuing supplies of natural rubber. The factory concentrates on large truck tyres, but also makes some car tyres, mainly for export. Another State factory is engaged in retreading, a third is producing rubber pipe and rice mill rollers, two others are making motorcycle and bicycle tyres, and one of the Phnom Penh textile units makes rubber shoes. There are also hundreds of private artisans engaged in producing these and other rubber goods, since they are free to find moulds and compete with the State firms. Floor tiles are not made yet.

f. Timber and wood products

The export of timber was a subsidized monopoly of the State-owned SONEF in the 1960s. Only two of the country's 500 or so saw mills were in the State sector, operated with relatively obsolete equipment in Kampong Ton and Kampong Speu by SONASCIE, but the only plywood producer was yet another State-owned company, SONACO, set up at Dey Eth in the late 1950s with Chinese assistance. The latter produced 3,300 m^3 in 1968, including 1,000 m^3 for subsidized export, and was planning to expand output to 6,000 m^3. At that time a group of foreign investors was considering the establishment of another, more export-oriented plywood factory at Kampong Som. Other than for plywood, there were no large establishments for the further processing of wood in the 1960s, but many small-scale enterprises and artisanal workshops were making furniture, other domestic articles of wood and baskets. Wood carving also was an important activity, and was expected to expand with the anticipated growth of tourism.

At the present time there are two forms of logging operation for forestry exploitation, for which the Phnom Penh authorities have set annual extraction limits that sum to 300,000 m^3. This level was approached in 1988 when total output was reportedly 280,000 m^3, the same as in 1969 and a sharp recovery from 11,000 in 1980 and 120,000 in 1986. Export, which can occur under both forms, is expected to total 80,000 m^3 in 1989, including both logs and sawn timber.

The two forms are:

- Khmer-only, with either State or private production groups, known as *krom achivekam* doing the logging, with a combined maximum of 180,000 m^3 set for 1989; and
- cooperation with foreign parties under bilateral contracts with the Government; the maximum cut for all such contracts combined is set at 120,000 m^3 for 1989.

In the second form, the Government partner determines areas to be exploited on the basis of

LANDSAT and ground inspections, and provides the trees to be cut, while the other party is responsible for logging labour, materials and equipment. Each such venture pays 5 percent of the value extracted to the local authority to cover the costs of security and administration; so far several contracts have been concluded with Vietnamese organizations and some are now under negotiation with Thai groups. Indeed, one Thai buyer is expecting to buy 140,000 m³ over the next 12 months, which would exceed the total quota for this form of exploitation and far exceed the 1989 export projection for both forms combined.

Government policy is to encourage the export of sawn timber (and of manufactured and artisanal products) rather than of logs, and two types of measure are being taken to implement this. First, the Forestry Department will have a monopoly on export of logs and timber (but not manufactured products), through a new agency called KAMFOREXIM. Second, the State has established a modern mill with automatic Japanese equipment to make panelling and various other shapes and forms for export.

There are currently 206 other sawmills, both large and small, throughout the country, some owned by State agencies (e.g. the Ministries of Industry, Commerce and Education), some by *krom* and some by private entities. Two Education Ministry mills, which also make products, have been supported by AFSC.

Under a recent law, further mills will require Ministry of Agriculture approval, and the existing ones will be examined with a view to rationalizing their location. The SONACO factory has not yet had its old Chinese plywood making equipment restored, and the Government is seeking external assistance for this purpose; discussions with Czech and Japanese have not yet borne fruit. Meanwhile the factory is being used to mill timber (as one of the three Ministry of Industry sawmills) and to produce furniture for State and other organizations. It is now functioning as an autonomous enterprise but present production is according to a plan approved by the State.

Apart from further processing by the new State mill, the Education Ministry mills and in the former plywood factory, many small private units have emerged once again to produce furniture and other wood products, including carving. The Government hopes that this will become an important export activity, but it may take some time for the relevant craft skills to be learned by sufficient people. JANGOO and some other sources have been providing assistance in this regard. At the present time high quality wood is often used for purposes that could be served by more ordinary timber. Another problem is that neither the new State sawmill nor the other mills have facilities for proper drying and chemical treatment to ensure suitable quality for export. For timber exports this lack can be replaced by subsequent treatment abroad, but domestic facilities are essential to facilitate the successful export of wood products, especially to temperate countries.

3. Mineral and Chemical Products

a. Petroleum

A 65:35 joint venture between the State and a French group was set up in 1967 to refine imported crude in a facility with annual capacity of 600,000 tonnes at Kampong Som. Half of the investment was financed by a French loan to the Government. The refinery was expected to process 400,000 tonnes in 1969, and to achieve annual exports of 120,000 tonnes of naphtha and fuel oil. Although the venture was not expected to be profitable for some time, it would save foreign exchange and provide more secure supply than import via the Mekong. Expansion plans at that time comprised units to produce gas and asphalt for domestic use. Meanwhile a mixed enterprise, TELEKHMER, was formed to share domestic distribution of oil products with Shell, Caltex and Esso.

The refinery soon ceased operations as a result of bombing damage, and has not been reactivated. The Government is now seeking assistance to study the scope for its restoration. Talks have been held with the USSR, the country's main supplier of oil products over the past decade but no arrangement has been made. Another possible source of rehabilitation could be Thailand.

If it became operational, the refinery would utilize wholly imported crude unless reserves could be found and exploited in Cambodian waters or land. As noted in Chapter II.F above, a full survey of the nation's offshore oil and gas prospects was conducted in the 1960s in cooperation with ELF, of France. However, the Government will require assistance to review this work after recovering its documentation, the Phnom Penh copies of which may have been lost during the 1975-78 period.

b. Fertiliser

A largely State-owned company with some private foreign and local participation, SOKPHOS, was established in 1963 to pulverize and bag the fairly low quality phosphate deposits then available at Tuk Meas in south-eastern Kampot province. Its annual output of 12,000 tonnes was distributed by the State fertilizer monopoly, OROC, which also imported richer phosphates that could not be combined efficiently with the SOKPHOS product because of its location. At the end of the 1960s a small plant was set up to exploit deposits found at Phnom Thom in the north-west (now in Banteah Mean Chey province), and the Government was planning to search for further deposits and/or to establish a large plant at Kampong Som to process imported phosphorites.

The Tuk Meas unit was destroyed twice during the 1970s -- first by bombing after which it was rebuilt on a larger scale, and second by looters. It was restored again in the early 1980s with assistance from CIDSE and LWS, and was producing 5,000 tonnes a year by 1988 with considerable scope for expansion when two problems are solved:

- lack of suitable extraction equipment to enable the exploitation of relatively rich deposits at higher elevations (35 percent compared with 8 percent at the more accessible site); and
- lack of sufficient facilities for storage and road transport for distribution of the product from the plant to other agricultural areas.

The Phnom Thom unit was enlarged and operated during the 1975-78 period, and its equipment was rehabilitated with local initiative and assistance from CIDSE, ACR, PADEK and Oxfam-America (including prospecting equipment) shortly thereafter. It has continued in operation since then and is producing 4,000 tonnes a year, almost its full capacity, but the plant now needs further modernisation. More significant, the present production level could be expanded only if new deposits can be found. To this end, the Banteay Mean Chey provincial industry department is seeking assistance to obtain equipment for a survey of the surrounding mountains.

No nitrogenous fertiliser is produced, although under consideration in the late 1960s were separate plants to (1) process by-products of the new refinery at Kampong Som into urea, and (2) mix some of that urea with phosphatic fertiliser. At 35,000 tonnes of annual capacity, the former was to be very small by world standards, and the 1970 World Bank report considered these plans to be premature pending expansion of the country's use of nitrogenous fertiliser at that time (then only 5,000 tonnes a year) and improved understanding of appropriate mixtures for rice production. Since then the importation and use of straight urea and mixed fertilisers has increased -- to 20,000 tonnes and 15,000 tonnes respectively in 1988 -- but domestic production is not likely to be economic in the absence of gas surpluses.

c. Cement

One of the large plants established with Chinese assistance in the 1950s was SONACIMENT, which converted limestone and clay in its Chakrey Ting (Kampot province) vicinity into cement of good quality. Output in the late 1960s reached 60,000 tonnes, which was one third of domestic consumption at that time. As noted in Chapter II.F above, the plant's production was expected to double in 1969 and grow further to 150,000 tpy in 1970, while the building of a new, 300,000 tpy plant at the same location was under consideration to utilize the area's abundant supply of limestone, clay and water.

The two plants would have been more than adequate to meet domestic demand which was expected to reach 365,000 tonnes by 1974 and to expand further with the expected requirements of the Prek Thnot and other power and irrigation projects as well as facilities for tourism development. However, the new investment could not have been financed by SONACIMENT itself, which sold its output at a fixed price below cost to the State-owned distribution monopoly, SONAPRIM, yielding annual deficits which were partly met by subsidies from SONEXIM using proceeds from duty on cement imports.

In the event, the second plant was never built and production in the first declined drastically during the 1970s. Even following the restoration of its clinker conversion facilities with LWS assistance in the mid 1980s, annual output has not yet reached 3000 tonnes and the country remains dependent on imports, mainly from Vietnam, to meet the huge demand caused by the need to rebuild destroyed bridges, public buildings including hospitals and schools, and private housing -- as well as resuming development of hydro-electric and other schemes which require large quantities of cement.

In addition to improving security in the vicinity of the plant, the Government proposes that it be reconstituted as a mixed State/private company. Four sets of costs could be involved in utilising it effectively to reduce import dependence:

- First, much more substantial rehabilitation of the main processing equipment is required, and technical discussions have been commenced with its original suppliers to this end. Detailed arrangements have yet to be made, however, and a large amount of financing will be needed.

- Further expenditure will have to be incurred to ensure provision of raw and semi-processed materials for the main process. Up to now, the plant's clinker stocks have been sufficient to meet its modest material needs, but these are now exhausted and there is an urgent need to restore its extraction and preparation facilities even to maintain the plant's present rate of cement production. It particularly requires crushing, mixing and boiling machinery, but its excavation and transport equipment also are inadequate. In the meantime, clinker is to be imported from neighbouring Vietnam on a barter basis.

- A third area in which financing will be required is energy. Over the past few years the plant has been able to run on its diesel generator, but the resumption of clinker preparation and/or the expansion of cement production will necessitate the use of its steam turbines, with consequent large requirements for imported fuel oil, until hydro power is available.

- Finally, the plant's location requires either road or multi-modal transport for distribution of its product to the rest of the country. It may be desirable to consider the feasibility of a rail spur from Kampot (of about 10 km across flat terrain) to link the plant to the main Kampong Som - Phnom Penh line.

Cement products such as well rings and pipes, house pillar footings, reinforced pillars, and culverts are produced mainly by small-scale private operators and various Government agencies for their own use. The Department of Hydrology's culvert production has been assisted by AFSC in Kompong Chhnang and by MCC in Prey Veng and Phnom Penh.

d. Bricks and ceramics

There were 166 producers of bricks and floor and roof tiles at the end of the 1960s. One was a modern factory at Chak Angre on the outskirts of Phnom Penh, another at nearby Takhmau specialized in small floor tiles, and several others were operating on a semi-industrial scale. These had Hoffman furnaces, while the smaller units generally used charcoal. Pottery was being made by one industrial scale enterprise at Bek Chang, whose wide range of products included latex collection bowls for the rubber plantations.

There were also numerous small-scale kilns and potteries, especially in the Kompong Chhnang and Kompong Cham areas; some of these exported earthenware to (then South) Vietnam. The State-owned SONAC which had been established in 1964 was producing annually 10,000 m^2 of floor tiles as well as other ceramics, but did not prove to be a profitable venture.

At the present time there are again many operations, both large and small, run by private individuals and groups as well as the central and provincial Governments. The old Chak Angre brick and tile facility is operating semi-autonomously under Phnom Penh city control, while the Takhmau kiln requires improved equipment for its small tile production and is proposing to diversify into other ceramics which are now being imported. The Bek Chang plant, now making five million latex bowls a year, also intends to establish a second line to make other ceramics. One of the Phnom Penh units (along with a leather producer) has received help to make parts for the 11 prosthetics workshops which AFSC has been assisting in Phnom Penh and elsewhere.

e. Glass

Glass was produced in four enterprises by the end of the 1960s, including the State-owned company VERRIERE d'ETAT which had been established with Chinese assistance at Stung Meanchey in 1963-66. It produced 3,600 tonnes in 1968 including its captive market in bottles for SKD and the large softdrink makers.

Still using silica sand found at Tuk Sap, there are now three facilities with daily capacities of one, six and 15 tonnes. The smallest resumed production in 1979 and is making drinking glasses. The 15 ton/day unit was restored in 1986 to make soft-drink bottles, but is currently out of operation through lack of refractory brick. The middle-sized facility, which is yet to be brought into production, is intended to make more solid tumblers than is possible in the small unit; fairly extensive rehabilitation including the acquisition of specialised moulds will be required.

f. Chemical products

In the 1960s the pharmaceutical and perfume industries were reserved to the State, which also had a minority interest in compressed gas production, while other activities in the chemicals subsector were in private hands. The manufacture, import and wholesaling of drugs was under the control of the State-owned ENAPHAR from 1965, although a few products were made for it under contract by two private firms. As noted, the State alcohol monopoly SKD made perfumes as well as beverages, combining redistilled alcohol with imported extracts. The compressed gas concern, SOKOA, which was 75 percent owned by Air Liquide of France, produced oxygen, nitrogen and acetylene.

Table III.2

MANUFACTURING AND ELECTRICITY PRODUCTION IN 1988

Product group	Estimated total mnfg & h/craft		50 Ministry of Industry establishments		
	Value (m.riel)	P.c.incre from 1987	Value (m.riel)	Percent share	Imports (m.riel)
Food processing	1747.2	33.9	1181.4	67.6	285.6
Cigarettes			1064.5		
Other			116.9		
Textiles	255.4	19.3	35.1	13.7	164.4
Chemical incl rubber	213.2	58.5	83.5	39.2	136.4
Mechanical	138.4	-10.4	46.8	33.8	9.1
"Light"	90.2	59.3	28.1	31.2	5.0
Constrn. materials	45.6	44.8	4.5	9.9	0.2
Other Min. Industry					
Transport Co.			23.8		
"Unity" Dept.			4.5		
SUBTOTAL MNFG	2489.9	31.4	1407.7	56.5	600.6
ELECTRICITY	482.4	36.9	39.2	8.1	66.1
TOTAL MNFG & ELEC	2972.3	32.2	1446.9	48.7	666.7

Source: Ministry of Industry, Phnom Penh

The private enterprises in the subsector at that time included three industrial scale and more than 25 other soap makers, four toothpaste manufacturers including one under foreign license, two producers of glue from fish and tanning wastes, and a match factory satisfying domestic requirements. A new factory to produce detergent was established in the early 1970s, and insecticide production was under consideration by some potential foreign investors.

The status of production of these various products at the present time is as follows:

- Four pharmaceuticals units including the former ENAPHAR facility and a factory making intravenous fluid operate under control of the Ministry of Health, which also issues permits for private import and domestic trade in drugs. Another I.V. unit is operating in Kompong Chhang province, while animal vaccine is produced under the direction of the Ministry of Agriculture in Phnom Penh. There is also a small-scale traditional medicine factory which processes some of the cultivated and wild herbs supplied by governmental and many private entities.

External assistance to these activities has included support from CIDSE and SRK (for I.V. fluid production), AFSC (for animal vaccine), and WCC.

- Perfume is still produced by SKD, but on a very small scale in the absence of foreign exchange for extracts and bottles.

- The SOKOA industrial gas plant is operating under the Ministry of Industry but in spite of assistance from LWS it is currently in critical condition. It lacks separation facilities, regulators and other guages, and sufficient bottles for oxygen and acetylene to meet the country's health and metallurgical needs. Some pumps have been restored and others received, but the need for additional equipment is urgent. Carbon dioxide is being produced for the SKD soft-drink factory.

- Two Ministry of Industry units and several provincial units are making washing soap in cake form, using oil from copra, kapok and rubber fruit. One of the Phnom Penh factories has been helped with materials provided through WVI, while the operations at Chak Angre and in the Battambang, Kompong Cham and Kampot provinces have received assistance from MCC in association with its help for oil production. Local output cannot yet satisfy domestic demand, so some imports from the USSR are still required. Some of the units are starting to produce shampoo, but they need technical know-how for this as well as for making perfumed soap. Soap powder is produced on an artisanal basis. The detergent plant presently awaits rehabilitation.

Table III.3

OUTPUT OF SOME MINISTRY OF INDUSTRY CONTROLLED FACTORIES, 1982-88

Industry	Unit	1982	1985	1988	rem
FOOD, BEVERAGES AND TOBACCO					
Wheat flour	tonnes	1757	---	497	(1)
Sugar	tonnes	---	181	140	
Condensed milk	'000 tins	340	---	---	(1)
Ice	'000 tonnes	34	34	20	
Softdrinks	'000 cases	223	153	165	
Sodawater	'000 cases	---	400	210	
Medical alcohol	'000 litres	10	42	54	
Liquor	'000 bottle	---	1568	1500	
Alcohol	'000 litres	196	2200	2000	
Filter cigarette	milln pkts	12	50	80	
Other cigarette	milln pkts	---	23	40	
TEXTILES					
Cloth	'000 metres	1519	3519	4370	
Sarong	'000 metres	---	908	3500	
Kromar	'000 metres	1556	2166	350	(2)
Vest	'000 pieces	10	36	35	
Mosquito net	'000 metres	1388	2166	1200	(2)
Compress	'000 metres	---	299	700	
Cottonwool	tonnes	---	22	28	
Blankets	'000 pieces	5	100	150	
Tyre fabric	'000 metres	---	100	190	
RUBBER & CHEMICAL PRODUCTS					
Car/truck tyres	pieces	7000	31000	30000	
Car/truck tubes	pieces	34000	25000	14000	
Retreaded tyres	pieces	2200	6500	7000	
Bicycle tyres	pieces	36000	18000	198000	
Bicycle tubes	pieces	76000	20000	12000	
Sandals	'000 pieces	21	1070	800	
Pipe	metres	6200	16500	40000	
Fanbelt	metres	---	30000	24000	
Oxygen	'000 m^3	---	70	160	
Acetylene	'000 m^3	---	17	13	

\continued

Remarks:
(1) Lack of raw materials; (2) Transfer to artisanal production; (3) Transfer to provincial authorities.

- Glue production on an industrial scale is occurring only in the Chak Angre tannery. Its product is mixed with calcium for construction purposes.

- A large operation at Chak Angre makes a variety of plastic goods, using old equipment which has been collected from several smaller units. Its products include jerry cans, bags and ponchos. All raw materials are imported and it is difficult to find spares for the different types of old machine. Plastic bags are being produced in Battambang (with CIDSE assistance) for use by the phosphate plant. Plastic (and rubber) shoes are made in the "Bata" factory when raw materials are available.

Table III.3 continued

Industry	Unit	1982	1985	1988	rem
Carbon dioxide	tonnes	---	115	100	
Phosphate	tonnes	---	---	1000	
Paint	tonnes	---	---	45	
CONSTRUCTION MATERIALS					
Sawn timber	cu. metres	750	3040	3450	
Bricks	'000 pieces	1498	4101	1800	
Tiles	'000 pieces	---	353	99	
Cement	tonnes	---	1992	2000	
(other materials are made under DG of Construction)					
ENGINEERING GOODS					
Water tanks	pieces	187	100	460	
Ploughshares	'000 pieces	137	212	150	
Tractor ploughs	pieces	---	100	60	
Spare parts	tonnes	13	212	105	
Bicycles	pieces	---	10000	14000	
Buckets	pieces	3500	136000	170000	
Aluminium prods	tonnes	100	57	32	
Cooking pots	'000 pieces	210	102	88	
Bowls	'000 pieces	272	1913	86	
Nails	tonnes	855	1143	610	
(other products include wood and steel boats, saw-milling and brickmaking machinery, and water pumps)					
LIGHT INDUSTRY					
Paper	tonnes	312	180	211	
Exercize books	'000 pieces	---	9671	10000	
Plastic prods	tonnes	---	21	150	
Printing	tonnes	29	81	285	
Soap	tonnes	19	287	800	
Latex bowls	'000 pieces	427	3500	4000	
Glass products	tonnes	---	---	1386	
Leather goods	tonnes	---	15	20	
Coconut oil	tonnes	7	---	---	(3)

Remarks:
(1) Lack of raw materials; (2) Transfer to artisanal production; (3) Transfer to provincial authorities.

Source: Ministry of Industry, Phnom Penh.

- There is still no production of matches or of toothpaste. The match making equipment is in storage (presently in the factory that makes rubber pipe) but it cannot be utilized until the technical know-how is available. The machinery which formerly was used to manufacture toothpaste has yet to be located following its dispersal in the late 1970s.

4. Metals and Engineering

a. Metalworking and repair

Appropriately for a market of Kampuchea's size, basic steel production has not been attempted, although there was a Government proposal in the late 1960s to transform domestic and imported scrap into billets on a scale well below internationally profitable levels. However, several smelting operations were functioning in the 1960s, and the State sugar and cement firms had well equipped foundries. More than 250 small-scale establishments were producing a wide range of metal products including agricultural implements, boats, pumps and scales, and over 40 shops were engaged in vehicle repair. A private company, METALKHMER, was planning in 1970 to commence production of tinned cans for the milk to be produced by SOKILAIT and for other products, possibly including oil lubricants.

There are again many small workshops making a wide variety of metal products, in addition to which the Government has established considerable capacity in nine central units equipped with machinery collected from various sources. Several assistance programmes have been directed towards the small-scale operations including ACR help for training in tinsmithing and for materials to make garbage tanks in Battambang, Oxfam support for boat building in Kompong Cham and Prey Veng, CIDSE and PADEK assistance for agricultural machinery repair in Phnom Penh, and support from AFSC, Oxfam, PADEK and

JANGOO for pump repair in Kompong Chhnang, Prey Veng, Takeo and elsewhere.

The Ministry of Industry units may have accounted for about a third of total production in this sector in 1988. Apart from a newly recommissioned factory which makes flashlight batteries, their main product lines are as follows:

- Unit No. 1 makes water tanks of 5000, 10,000 and 20,000 litre capacities, truck bodies, complete sawmilling plant (excluding blades and motors), and brick making equipment. Its branch at Km-6 (formerly a French engineering firm) builds 200-ton boats.
- Unit No. 2 makes tanks, hoe heads and other agricultural equipment (mainly ploughshares and shoe-wings), steel construction materials, and factory spares.
- Unit No. 3 assembles bicycles from 45 internally produced and five imported parts, and is currently proposing to add motorcycle assembly.
- Unit No. 4 makes machinery spares for various factories, especially textiles.
- Unit No. 5 makes nails, barbed wire, and netting.
- Unit No. 6 has another nail production line, and also makes manual water pumps.
- Unit No. 7 makes large bolts for bridge building, and is hoping to restore its screw making equipment and obtain technical know-how for operating it.
- Unit No. 8 makes steel parts of oxcart wheels; it also has printing and stamping machinery for making crown corks, but rehabilitation and technical know-how are needed to make this operational.
- Unit No. 9 specializes in cutting and pressing aluminium sheet imported from the USSR to make hollow-ware, cutlery and other aluminium products. It is considering the scope for making steel products also, particularly bowls for enamelling if it can obtain the machinery and know-how.

b. Assembly operations

By 1969 there were more than 30 bicycle assemblers and three transistor radio assemblers in operation. A State-owned firm, SONATRAC, had installed capacity to assemble 1,000 tractors and 800 trucks a year, but never exceeded 25 percent utilisation due to shortage of both foreign exchange and demand. Meanwhile the company was importing motorcycles and planning to establish a service facility for tractors and trucks. In addition, the Government at that time was planning a plant to assemble 10,000 motorcycles and 20,000 pumps a year, with the production of some parts to be subcontracted to private firms.

Apart from bicycles, none of the 1960s operations have been reactivated but, as noted above, there is a plan to commence the assembly of motorcycles. In addition, the rebuilding of old three-wheel chariots, including their conversion to four wheeled format, has commenced.

c. Precious metals

During the late 1960s private individuals were extracting zircons, saphires and rubies in the Battambang and Stung Treng provinces, smuggling an estimated 80 percent of the stones abroad and selling the balance to the State-owned company SONEXPIEROR. The latter operated a small cutting shop which had difficulty in finding experienced cutters, and was planning to conduct surveys of deposits in the Ratanakiri and Pailin regions in order to determine how the industry could be operated on a more commercial basis, with greater value added accruing to the nation.

SONEXPIEROR no longer survives and the intended surveys were never conducted. Meanwhile extraction continues on a private basis. The Government is trying to exercize control over the Pailin and Ratanakiri areas, in the hope that a considerable proportion of the gems would pass through Phnom Penh to enable their taxation, rather than being smuggled directly by miners, soldiers and traders to neighbouring countries.

At least on the western border, however, there is abundant evidence that considerable unofficial export continues to occur by land and sea, sheltered from official control by the present unsettled security situation. It is also reported that smuggling continues to occur on the eastern border.

Gem cutting has not yet commenced as a domestic industry to add value to the country's gems, but a training centre has been set up in Phnom Penh.

Artisanal activities in this sector which may have more immediate prospects for development (assisted by the expected recovery of tourism following improvement of the security situation) could include the resumption of silver plating and pagodite sculpture.

C. PRIORITY NEEDS AND PROSPECTS

Care must be taken to avoid the temptation to meet urgent needs for inputs to agriculture, construction and other sectors that require rapid recovery, through state promotion of industrial activities which could turn out to have a high domestic resource cost. Moreover, the state's limited technical, financial and entrepreneurial resources will need to be directed towards the twin tasks of policy making to ensure an appropriate environment for efficient industry and development activities in infrastructure and other sectors where public management may be essential, rather than to the public industrial enterprise which has been a feature of most political regimes since Independence.

These caveats notwithstanding, there are some manufacturing activities which would merit early action -- including possible state investment -- without much further feasibility analysis. The expansion and rehabilitation of rubber processing and cement production are obvious examples, perhaps followed by phosphatic fertilizer, cotton textiles, industrial gases and wood processing and some other agro-based industries.

External assistance could be sought for state involvement in such areas, at least with respect to promotion if not investment. The highest priority, however, should be accorded to support for planning and studies -- including research to help determine the fate of the large nominal portfolio which the present authorities have inherited -- and for the development of capacity for public policy analysis and implementation.

1. Planning and Studies

Several activities of an inventory and pre-feasibility nature may be required to facilitate the process of determining action on present State involvement in the manufacturing sector, and to identify opportunities which could then be taken up by either public or private investors. Four which could be commenced fairly soon, perhaps along the lines suggested below, are:

- an assessment of the present State portfolio (including factories operated by provincial authorities);
- pre-feasibility studies on three or more agro-processing activities;
- a study of the textiles subsector, combined with a pre-feasibility analysis for an integrated mill; and
- a comprehensive study and assistance programme for wood processing.

a. Assessment of present State portfolio

Both the central Government and provincial authorities have inherited a large number of former private and State-owned industrial enterprises in various conditions ranging from fully operational to completely devastated. Some of them were never appropriate in scale or design to the country's needs and resources, while in others the once appropriate equipment is now obsolete. Many of them have been at least partially rehabilitated over the past decade, but economic criteria may not have been used to select these. Some which are not yet operating fully could do so without modifying the plant if/when demand and material supplies permit, but in most cases further investment would be needed to achieve optimal performance.

A comprehensive assessment of the present and potential viability of the national and provincial enterprises is required to facilitate Government decision-making on what actions should be considered for each of them. Such decisions may be needed on:

- policy, especially with respect to private and/or import competition with continuing State production in each industry;

- ownership, i.e. whether to maintain State or provincial control over investment and operations, to lease the plant in its present condition to a private investor/operator, to wholly or partially dispose of the public interest in the enterprise, or to sell the remaining assets;

- further public investment to rehabilitate, modernize and/or expand the present operation; and/or
- assistance with respect to training, materials supply and marketing.

The proposed assessment should cover all manufacturing and industrial enterprises under the control of the Ministry of Industry, sector Ministries such as Education, Agriculture, etc. and provincial authorities, which would employ 10 or more persons. A team of three experts (in industry economics, engineering and finance), working closely with Ministry counterparts, could complete the work within three months under terms of reference with the following six elements:

(1) an inventory of such enterprises, containing basic data on the location, size, specification and condition of land, buildings, major equipment, production process, product range and present management of each;

(2) an estimate of the investment cost of major rehabilitation in those cases where this would be possible and required to enable normal efficient production to commence or continue, taking into account the scope for repairing or replacing obsolete plant;

(3) a provisional description of the effective domestic and potential export demand facing the industry at prices which would cover operating and new investment costs;

(4) estimates of both the scrap value of each enterprise and the net present value of the production stream which could be achieved with rehabilitation and efficient management;

(5) brief discussion of strategic factors such as employment, security and intersectoral linkages which the Government might wish to consider alongside financial aspects; and

(6) establishment of a permanent monitoring system for public investment in manufacturing.

Such an assessment should provide the Government with the necessary basis to determine its strategy for each industrial enterprise under its or provincial control. In particular, the Government should be substantively equipped to engage in negotiation with prospective buyers, joint-venture partners or lessees; to commission feasibility studies on new public investment in rehabilitation; and to plan appropriate infrastructural and other support for major elements of the manufacturing sector. This should facilitate improved efficiency and equitable terms for the entry of private capital.

b. Agro-industry prefeasibility studies

Development of agro-processing is desirable to provide a market -- including potential export -- for diversified agriculture and thus improve cash incomes for many of the country's full and part-time farmers, who comprise most of the population. In some cases the potential supply of produce may emerge with only modest promotion once effective demand exists, and the scope for new investment in processing to create such demand may be self-evident. In other cases, however, where the situation is less clear, pre-feasibility assessments are required before specific crop promotion programmes or processing investment projects can be defined and subjected to feasibility study. The assessments are needed to help resolve such basic issues as the appropriate mix between small-holder and commercial farming, the possiblity of export rather than focus on the weak domestic market, and factors affecting the optimal size, technology and location for processing facilities.

The immediate objectives of this proposed group of pre-feasibility studies would be:

- to begin the establishment of Government capacity for making assessments which must involve both agricultural and industrial considerations at the pre-feasibility stage; and
- to undertake several such assessments on potential new or expanded activities the prospects for which seem good but are subject to economic and technical conditions that need careful analysis.

These should be small but important steps towards the longer term goals for raising farm incomes, adding value through further processing, and diversifying exports.

The project could comprise the concurrent conduct of three or more separate pre-feasibility studies dealing with quite different inputs and products, their common themes and features being:

- the need to explore the scope for both growing (by smallholders and/or commercial farms) and processing (by new or rehabilitated plant),
- the sharing of project personnel other than sector specialists, and
- on-the-job training for Ministry officials in pre-feasibility methodology.

The first three studies could deal with:

(1) sugar -- expansion of cane growing and either complete rehabilitation of the 15,000 tpy Kompong Koi refinery or establishment of smaller local refineries;

(2) fruit juice -- expansion of orange and other fruit growing and rehabilitation of the SKD juice plant, including its export potential; and

(3) vegetable oil, starch and/or animal feed -- expansion of the production of oil seeds (castor, kapok, rubber fruit etc.) and other oil crops (especially coconut and corn), and either the establishment of medium/large scale multi-product processing and refining capacity or the improvement and replication of several existing oil and animal feed plants[1] and the establishment of a starch plant. (Among the NGOs, MCO and CIDSE have been assisting some oil seeds cultivation and processing.)

Other possibilities for study include jute, paper, and vegetables.

The project should provide the Government with an objective basis for making two types of decision -- whether to proceed with more detailed planning and feasibility analysis, and whether and in what form to invite private participation -- in several potentially important agro-industries. It should also strengthen the technical capacity of the two main Ministries concerned to undertake multi-disciplinary pre-feasibility analysis. A team of five (e.g. an industry economist, an industry engineer, a fruit/sugar agronomist, an oilseeds/corn agronomist and a food process specialist), plus one more person for each additional study which could be included in the project, working in cooperation with Ministry and provincial officials, should do the studies in two or three months.

c. Textile subsector study and pre-feasiblity analysis for an integrated textile mill

Although the country's existing textile production capacity is greater and in better condition than that of most other industries, there may be scope for either a major rehabilitation programme or the establishment of a modern integrated mill in addition to the minor upgrading of some of the old factories. A principal objective of the study would be to determine whether the scope for a new facility actually exists in the short/medium term. If so, the mill would probably need to have:

- an export orientation in order to exploit the economies of scale and the absence of quantitative restrictions on Cambodian textiles in US and EEC markets,
- capacity to weave both cotton and synthetic yarn into high quality cloth,
- modern dyeing, finishing and printing facilities, and perhaps
- knitting capacity.

The prefeasibility work should confirm or correct this assumption on the range of operations, and should determine approximately their optimal scale. These considerations would need to take into account the alternative approach of undertaking a major programme to upgrade, expand and perhaps divest the existing State units, thus serving the study's other principal objective: to provide an overview of the whole subsector's prospects and constraints, including the existing units' rehabilitation needs under two scenarios -- with and without a new mill. As this could be the first major study of its type to be undertaken in the industry sector, a third key objective would be to strengthen the Ministry of Industry's technical capability in this regard.

The subsector-cum-prefeasibility study would be undertaken for the Ministry of Industry by a team of three experts, working closely with

MOI planning department officials to be trained on-the-job. Its terms of reference could include the following elements:

(1) assessment of the present condition of the existing textile facilities;

(2) costing the major and minor rehabilitation and reorganization options available for them;

(3) quantity and cost projections of domestic short and long-fibre cotton supply, and world price projections for cotton and synthetic fibre and yarn;

(4) a review of alternative technologies available internationally for various textile products;

(5) estimates of fixed and variable production costs for different capacity configurations and scales in a new integrated facility;

(6) domestic and export demand projections, including potential demand for cloth from a commercial garment making industry;

(7) a comparison of the potential net benefits of establishing a new mill with those of a major rehabilitation programme; and

(8) if a new mill appears a viable option, a review of possible ownership structures for it and terms of reference for a feasibility study.

As an essential first step involving careful economic and technical analysis in a process of subsector reorganisation, the study's impact on development would be indirect but important. It should stimulate progress on improving and expanding efficient capacity in the textile subsector, while at the same time it should help avoid mistakes in programming these developments, in determining the policy environment to encourage them, and/or in negotiating with potential foreign or domestic private participants. The proposed team of three international experts (an industry economist, a textile engineer and a financial analyst), with substantive inputs from two Ministry counterparts assigned full-time and from Textile Combinat management, should be able to complete the project within two months.

d. Comprehensive assistance for wood processing

Forest-based industries ought to comprise one of the country's major sources of value added in efficient import substitution and export proceeds. To enable these benefits to be attained quickly and sustained over the long term, however, there is an urgent need for governmental intervention and assistance in several aspects of forestry management, log and lumber exploitation, and further processing in industries such as pulp and paper, furniture and joinery products, and artisanal carving. It may be helpful for the Government to undertake a project, with external assistance, with the objective of addressing the issues concerned in an integrated manner, through technical and economic research, planning, training and/or advisory services as required in the several production stages.

It should thus provide a comprehensive framework for further steps to build on the initiatives which the Government has taken on some aspects of the forestry sector, and should strengthen the technical capability of the government departments concerned to develop and implement well coordinated forestry, industry and trade policies. In addition, it should complement a proposed concurrent project (see Chapter II.E above) which is to be implemented by the Forestry Department and focussed more sharply on technical aspects of forest management and afforestation; alternatively, the two projects could be combined.

The project's main activity should comprise various forms of specialised technical assistance to an inter-departmental group (including Agriculture (Forestry), Industry, Trade and Planning officials) and also directly to public and private commercial enterprises engaged in logging, saw-milling and downstream processing activities. Its several components could include:

(1) an initial survey of existing species suitable for various forms of utilisation, to be conducted in cooperation with the proposed forest inventory which another project would support;

(2) techno-economic analysis of competing and complementary uses of land which involve some

form of existing or potential forestry;

(3) survey and profile of entities and species representing present and prospective demand for wood for fuel, construction, pulp making, domestic and export furniture, furniture parts and joinery, artisanal carving, etc.;

(4) formulation of a national forest resources conservation and exploitation (FORCE) programme which would outline objectives, projections, conservation control and incentive measures, investment and trade promotion strategies and technical support services;

(5) preparation of detailed guidelines for some elements of the programme such as sawmill registration criteria, identification of reserved species, standard royalty agreements. etc.;

(6) provision of technical assistance (advisory service and training as appropriate) to existing small-and medium-scale wood processors in fields such as equipment purchase and maintenance, timber selection, storage and treatment, basic and specialized carpentry and cabinet making techniques, workshop practice, book-keeping, design for export markets, overseas marketing, etc.;

(7) establishment of a State, mixed or cooperative enterprise to offer such services on a continuing basis and to act as a specialized standards organization and export agency for small producers; and

(8) preparation of a prefeasibility study on large-scale pulp and paper production.

In addition to these eight technical assistance components, the project could include:

(9) the provision of equipment and supplies such as wood treatment plant and chemicals, specialized tools, etc. which the Government would sell cheaply to workshops to encourage the adoption of improved techniques; and

(10) the arrangement and funding of study tours, attachments and formal training abroad for forest and wood industry administrators and staff of private enterprises.

This comprehensive project should not only provide a solid basis for the ecologically and economically sound exploitation of forest resources over the long-term, but also assist the making of immediate decisions on public policy, public and private investments, and the operations of several existing wood-based industries. It should thus contribute to significant foreign exchange earnings and savings, generation of new employment opportunities, and diversification of the economy.

The work could be conducted over two years by the proposed committee, assisted by a core team of two international experts plus several short-term specialists, especially with respect to aspects such as the feasibility of pulp and paper making and the delivery of advisory services and training for management and staff of small-and medium-scale wood processors. Some of these contributions could be made through specialized international organizations such as UNIDO, the International Trade Centre and the EEC's Industrial Development Organization. Other parties which may be interested in aspects of the work could include JANGOO and AFSC, which have been providing some assistance in this subsector, and the Czech or Japanese Governments which could be interested in restoration of the State's plywood plant.

2. Direct Support for Particular Activities

Apart from the above studies, there are a variety of ways in which industrial development could be assisted on a larger scale than can be managed within the present budgets of the NGOs. Such assistance is urgently needed to maintain or improve production in existing units, pending their attainment of financial self reliance following commercial investment and enterprise reorganisation. Some examples are:

- Provision of long-fibre cotton seeds in association with extension services and credit to smallholder growers.

- Expansion of the programmes initiated by UNICEF and JANGOO to provide supplies for household income generating activities, especially sewing supplies, and complementing such supplies with technical and marketing assistance.

- Further assistance for mulberry cultivation and sericulture to produce silk thread, targetted at those without religious objections to this activity.

- Provision of extraction and transport equipment for the Tuk Meas phosphatic fertiliser unit, to expand its production quickly pending consideration of a longer term investment.

- Provision of further phosphate prospecting equipment and technical assistance to the Banteay Mean Cheah provincial administration and, if further deposits are found, modernization of phosphate processing equipment for the Phnom Thom phosphatic fertiliser unit to expand its production quickly pending consideration of a longer term investment.

- Provision of nitrogenous fertiliser, of transport for its delivery, and of technical assistance on its application, perhaps in association with investment in a N/P mixing plant.

- Provision of equipment and technical assistance to rehabilitate the State's industrial/medical gas plant, especially its oxygen making and distributing capacity.

- Provision of technology and the equipment that may be required to upgrade and commercialize some of the provincial soap making units (to complement proposed investment in one or more of the Phnom Penh plants).

3. Commercial Investments

Without predetermining the appropriate source of investment (private/provincial/State, domestic/foreign, etc.), the following possible commercial activities are suggested for potential investors' consideration on the basis of the discussion in Sections 2 - 5 above.

- Joint venture to expand or duplicate the Phnom Penh cold storage facility and rehabilitation of the Koh Kong fish cannery.

- Re-establishment of a plant at Kompong Som to freeze marine shrimp for export.

- Purchase or lease and operation of the Phnom Penh reconstitution plant, combined with promotion of smallholder milk production.

- Joint venture to complete rehabilitation and to operate the SKD distillery.

- Joint venture to complete the renovation of the Kompong Som brewery and operate it.

- Paper conversion facility to make cigarette packs and other packaging material.

- Joint venture to complete rehabilitation and to operate one or more of the Ministry of Industry textile units (especially to exploit the knitting potential of unit no. 2).

- Establishment of a second jute mill, associated with promotion and technical assistance to expand smallholder production.

- Establishment of further rubber processing capacity.

- Joint venture to complete rehabilitation, improve technology and expand product range of the SONAPNEU and/or other State-owned rubber goods factory(ies).

- Establishment of one or more plywood factories, perhaps including the purchase, joint venture or lease and the rehabilitation of the former SONACO plywood mill.

- Joint venture to take over, restore clinker preparation, expand cement processing, and finance energy requirements for the Chakrey Ting cement plant, and/or to establish another plant in the same vicinity, in order to ensure annual production of at least 300,000 tonnes.

- Joint venture, purchase or lease of the Chak Angre, Takhmau and/or Bek Chang brick/ceramics plants to facilitate their modernization, diversification and expansion, or establishment of a new facility to make a range of ceramics for the domestic market.

- Separate joint ventures, purchases or leases to rehabilitate and operate commercially the 6 and 15 tpd glass making factories.

- Joint venture(s), purchase(s), or lease(s) of one or more of the soap and detergent-making plants, in order to expand capacity, diversify product range and improve technology for the manufacture of plain and toilet soap, liquid detergent, shampoo and soap powder, and perhaps diversify into toothpaste.

In several of the above cases, particular potential investors either have already identified themselves to the Phnom Penh authorities or can be identified on the basis of previous interest in the activity concerned. In milk processing, for example, there are a number of parties which could be interested including overseas Khmer individuals, Thai groups which have established a modern dairy industry based on smallholder producers in their own country, RICOFFI of France and the dairy firms of Australia, Denmark and/or New Zealand. Other activitites in which Thai groups have expressed interest already include cement and brewing. Meanwhile RICOFFI has reportedly commenced investment in frozen shrimp, and a large number of opportunity seekers from Australia, Japan, the United States and elsewhere have begun visiting the country to explore other possibilities.

4. Public Support for Industry

Apart from any investment which the State might retain or make in manufacturing production facilities, there are three important roles which the Government can play to facilitate the development of a viable industrial sector:

- Provision of a legal, fiscal and administrative environment which is conducive to efficient industrial investment and operations.

- Provision of certain support services to facilitate the entry of new Khmer entrepreneurs, to help adapt technology to local conditions, and to upgrade labour skills.

- Provision of infrastructure (or of fiscal measures to subsidise the private installation of services with social benefit).

Once the political and security situations are settled, it will be necessary to develop a series of policies to facilitate commerce and industry. Meanwhile, most other types of constraint have been avoided temporarily through the present authorities' low tax, minimum control policy. And a beginning has been made on the creation of the appropriate measures to encourage private investment in the more regulated environment which could follow the possible reorganisation of the Government.

In particular, a draft foreign investment law currently awaits formal National Assembly ratification, although more detailed guidelines have yet to be developed. The authorities may require outside assistance in order to benefit from the experiences of other countries in this matter, which calls for a fine balance between incentive and regulation.

The country's requirements for industrial support services are many, ranging from the re-establishment of statistical and other information on available raw materials, labour, production, etc., through technical standards setting and export promotion, to the vocational training discussed in Chapter V.C below. External aid could play two key roles in such regards:
- helping to build institutions which would provide the necessary support over the long term, and
- providing *ad hoc* assistance in the meantime.

One important area where a start has been made but much remains to be done is the financial sector. As noted in Chapter I.A, two State banks have been established and basic foreign currency transactions can be conducted in spite of the present diplomatic isolation. There will certainly be a need to extend the range of banking services to meet the particular needs of industry, especially small-scale enterprise, however. Consideration could be given to the readmission of foreign banks and/or the establishment of joint ventures in banking, insurance and other financial services.

With regard to physical infrastructure, Chapters IV.A-D below describe many initiatives which need to be taken in providing a suitable environment for economic activity, including manufacturing. In addition to general infrastructural developments, there are some which may be needed to facilitate the operations of particular establishments (such as cement).

IV. Physical Development and Infrastructure

A. WATER RESOURCES

1. Rainfall

Kampuchea lies between 10 to 15 degrees North of the equator and between 102 to 108 degrees longitude East. Two-thirds of the country is flat and 85 percent drains into the Mekong River. Most agriculture depends on rainfall which occurs mainly during the southeast monsoon (Table VI.A.1). Rainfall is on the whole plentiful, but it is so unevenly distributed seasonally that all localities experience a drought each year which varies in intensity and duration from place to place and from year to year.

Often there is a short pause in rainfall during the monsoon. Farmers tend to delay planting of crops to ensure they are not lost during this "dry". Table IV.A.1(b) illustrates the rainfall in 1972 at a number of locations. Table IV.A.2 shows the daily rainfall recorded at Kompong Speu during 1972, which illustrates the occurrence of the "short dry", that year in August. This station is also the principal one for the future Prek Thnot irrigation area and for a number of ongoing NGO projects. Chapter II.B above has discussed the effect of these phenomena on agriculture.

In 1988, the river flow was lower than normal. The monsoon trough was weak during the wet season and only one tropical depression approached the coast of Viet Nam during the flood season. Normally three to five storms would be expected during this period (July-September).

Detailed rainfall records available are annexed to this section in Table IV.A.6. The location of measuring stations is shown in Chart IV.A.I.

2. River Water

The Mekong River and its major tributaries, the Tonle Sap and the Se San basin are perennial sources of water. However, other water courses across much of the country cease to flow during the dry season. This is shown in Table IV.A.3. Tributaries with low "natural low flows" can be considered as reliable water sources only if reservoirs are created on them to tide over the dry periods.

Below Kratie, the Mekong River enters its delta, overflooding the plain on both banks in a complicated flow pattern as water level rises over 7 m above MSL. The overbank flow on the west bank escapes toward the Tonle Sap or the Great Lake. The Mekong main channel also adds its flow to the Great Lake through the Tonle Sap river at Phnom Penh Quatre-Bras, which acts as an inlet-outlet for the Great Lake. This reverse flow starts as the Mekong flood starts to rise sometime between April and June and continues until flood recession in October; at which time the Tonle Sap river then drains water from the Great Lake to the Mekong arms. The flow is therefore governed mainly by the storage effect of the inundated areas, the storage of the Great Lake, and the tidal effect which affects the river height at Phnom Penh.

Just below Phnom Penh, the Mekong divides into two branches, the continuation of the Mekong itself on the east and the Bassac on the west, routing respectively about 80 percent and 20 percent of annual flow to the South China Sea. When the Mekong's flow at Phnom Penh rises above 15,000 m^3, it not only runs to the Great Lake, but also spills into overflow channels toward the lowlands around the Bassac. Some 20,000 million m^3 of overflow empties back into the main branches as return flow yearly. The river level rises gently, at a rate of a few centimeters a day, and the flood lasts for several months.

Almost all of Kampuchea, except for the area southwest of the Cardamone Range, lies within the lower Mekong basin. Any improvement in the regime of the river and its tributaries and in the utilisation of their waters would significantly improve the life of the people.

3. Mekong Committee and Its Water Development Plans

a. The Mekong

The lower basin of the Mekong river covers large areas of Kampuchea, the Lao PDR, Thailand and Viet Nam. The river is a huge, underused resource. It could, through irrigation, fisheries and hydropower, feed and otherwise support not only the basin's population, but also many who live outside its catchment area. No single country is able to develop the river on its own, and each country has its own powerful reasons for co-operating in the river's development.

The amount of water that each year flows through the lower Mekong basin and into the ocean is vast (475,000 million m^3). If this water was used to generate power, the resources of the lower Mekong basic could supply electricity (more than 150,000 GWh per year) to all the countries in Southeast Asia, and possibly beyond, through an interconnected grid. There is also the possibility of using the water to irrigate some 6 million ha of cultivable land for rice and other crops and raising agricultural production in general. Ancillary work associated with the development of these water resources includes flood control and the improvement of navigation.

Table IV.A.1

RAINFALL AND TEMPERATURE

Location	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
(a) Average Rainfall in 6 Locations													
Kg Thom	3.0	17.0	50.0	71.0	181.0	219.0	225.0	186.0	320.0	210.0	66.0	20.0	1,570.0
Kg Cham	13.0	13.0	42.0	37.0	178.0	232.0	249.0	183.0	281.0	238.0	89.0	25.0	1,600.0
Svay Rieng	17.0	11.0	35.0	126.0	182.0	212.0	177.0	163.0	257.0	317.0	187.0	62.0	1,746.0
Phnom Penh	19.0	10.0	37.0	81.0	144.0	145.0	15[illegible]	158.0	228.0	253.0	140.0	43.0	1,403.0
Battambang	6.0	17.0	47.0	85.0	159.0	145.0	154.0	157.0	255.0	219.0	32.0	24.0	1,350.0
Siem Reap	3.0	13.0	28.0	65.0	156.0	181.0	208.0	202.0	281.0	236.0	88.0	16.0	1,477.0
(b) 1972 Rainfall in 12 Locations													
Battambang	N	39.2	8.9	140.0	22.0	250.5	38.4	75.5	199.3	136.4	327.1	22.1	1,260.4
Kampot	1.2	45.1	92.7	202.7	25.4	289.9	567.7	255.8	442.1	220.2	191.4	49.0	2,383.2
Koh Kong	3.0	35.5	114.4	261.9	131.9	711.7	693.3	798.4	599.5	243.8	206.4	82.2	3,882.0
Kg Cham	0.4	0.5	20.1	237.0	80.1	346.4	100.7	88.7	100.4	237.6	211.5	54.5	1,477.9
Kg Chnang	N	1.5	4.8	85.7	153.7	88.9	197.1	139.6	497.7	185.4	210.1	63.0	1,647.7
Kg Som	3.4	72.4	262.9	200.2	176.5	590.5	392.0	500.1	506.9	176.7	180.7	57.9	3,120.2
Kg Speu	N	39.5	71.3	142.5	109.3	192.9	109.6	69.5	174.5	225.0	163.7	13.7	1,311.5
Krakor	N	7.5	9.3	167.2	114.5	109.1	106.2	157.2	256.3	215.1	-	-	-
Pailin	N	34.5	66.4	28.7	38.9	160.7	105.4	70.2	416.8	73.2	242.3	22.3	1,259.4
PP Airport	N	6.3	23.2	126.5	69.9	290.7	108.2	81.2	119.9	205.0	239.9	19.2	1,290.0
Sisophon	N	23.3	39.3	196.7	88.0	212.9	172.0	41.3	340.2	213.2	131.0	4.3	1,462.2
Svay Rieng	4.0	59.0	1.5	277.0	27.0	280.0	204.5	133.0	311.5	348.5	279.5	45.5	1,971.0
(c) Average Temperature in 6 Locations													
Kg Thom	25.0	26.9	28.9	29.6	28.2	27.7	27.7	27.6	27.2	27.1	26.7	24.6	27.2
Kg Cham	25.7	27.2	28.7	29.1	28.1	27.6	27.1	27.2	27.0	26.7	26.0	25.1	27.1
Svay Rieng	25.8	26.7	28.2	28.7	28.2	27.6	27.4	27.4	27.2	27.1	26.7	25.8	27.2
Phnom Penh	26.1	27.6	29.0	29.6	28.6	28.1	27.5	27.6	27.2	27.1	26.7	25.6	27.5
Battambang	24.8	26.9	28.7	29.1	28.1	27.6	27.1	27.2	27.1	26.7	26.0	25.1	27.1
Siem Reap	24.4	26.3	28.1	28.9	28.7	28.1	27.3	27.3	26.9	26.9	27.2	27.0	27.5
Nation	24.9	26.5	28.1	28.7	27.8	27.3	28.8	26.8	26.5	26.3	25.9	24.6	26.7
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total

While the water resources potential of the lower Mekong basin is immense, the river runs through one of the poorest regions of the world. Annual per capita income in most basin areas is in the neighbourhood of US$140-440.

b. **The Mekong Committee**

Efforts made during the period between 1952 and 1956 by then Economic and Social Commission for Asia and the Pacific (ESCAP then ECAFE), to encourage the governments of the riparian countries of the lower Mekong to co-operate in developing these large water resources, finally resulted in the setting up of the Committee for Co-ordination of Investigations of the Lower Mekong Basin. Kampuchea was a founding member of the Mekong Committee, established in 1957. However, it has not participated directly since 1975. It has maintained contacts with the National Mekong Committees of Lao PDR and Viet Nam in recent years.

Because of the importance of accurate data, the first activity of the Mekong Committee was directed towards the collection of hydrologic data, including rainfall and stream flow. Other essential information – topography, soils, environment – has also been collected. Due to the existence of the Committee, the basic facts are available over many years of record.

This was made possible through international assistance obtained by the four riparian countries working together in the Committee.

Table IV.A.2

KOMPONG SPEU: DAILY PRECIPITATION IN 1972

DAYS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1				3.0		18.4		3.0		24.9		
2									13.8	1.4	6.6	
3							1.2			86.6		5.6
4							3.0		20.8		3.5	2.2
5						11.3		19.5	15.3			4.0
6						25.3	5.3	4.2	19.6			1.9
7				13.1		13.2	3.1		19.4			
8		3.7		52.1	32.8							
9						7.2					3.3	
10		2.6		38.8	5.5	3.1		5.3				
11		6.6				5.1	19.2		5.7			
12							4.8	2.0				
13						52.6	2.7				4.3	
14					14.5	22.3			9.3	7.2		
15							19.0		2.3	10.3		
16								2.1		2.3	33.5	
17								6.5	19.7	59.1	19.0	
18										9.4	25.5	
19						11.8		4.1			2.8	
20							10.4				31.7	
21									3.4		4.7	
22										1.9		
23		4.6				17.0	27.7				8.4	
24						1.5						
25			8.0							5.6		
26				35.5	2.3					7.3	12.2	
27					15.0		5.1		4.8			
28						1.0	0.6			9.0		
29		22.0	58.7			0.9	0.9		31.8			
30						2.2	4.5		8.6		8.2	
31			4.6		39.2		2.1	22.8				
Total	N	39.5	71.3	142.5	109.3	192.9	109.6	69.5	174.5	225.0	163.7	13.7

Annual Total: 1,311.5 mm

The extent of the task attracted the international community. Economies of scale were achieved, which meant that this type of assistance was rendered more efficient; and the added political dimension of promoting peaceful co-operation among the riparian states, which (it was hoped) would lead in turn to greater self-sufficiency and self-reliance in their collective and individual development, were both factors that encouraged donor countries to be more generous than they would have been in the case of purely national projects. Financing for the US$30 million Prek Thnot project, for example, was arranged as result of the stimulation of international interest in the project, including an appeal by the Secretary-General of the United Nations for worldwide support. Similarly, the costly and time-consuming studies for Sambor, Battambang and Stung Chinit would probably not have been made if it had not been for the fact that they fitted into a larger development plan for the basin as a whole.

For Kampuchea, the existence of the Committee means that data are available covering quite large areas of the country, even though direct participation has not been possible for the past years. The existence of these data means that if, over the longer term, it is decided that the construction of larger-scale mainstream projects can meet the requirements of the evergrowing population in the basin, the basic information will be available. However, such projects can only be built and operated if all countries concerned consult and decide together. Only then can the right decisions - including those involving social and environmental factors - be reached and proper advantage taken of the huge investments in money and manpower that would have to be made. On the reverse side, the damage that could be done to Kampuchea by unco-ordinated unilateral intervention upstream could be disastrous. The Mekong Committee provides the riparian countries with a permanent institution where they can consult with each other and co-ordinate their plans for water resources development.

The Statute of the Mekong Committee provides, inter alia, that the Committee shall consist of one member from each country (at that time Cambodia, Laos, [South] Viet Nam and Thailand) *with plenipotentiary authority ... to promote, coordinate, supervise and control the planning and investigation of water resources development projects in the Lower Mekong basin.*

The Statute also empowers the Committee to *...make requests on behalf of the participating governments for special financial and technical assistance and receive and administer separately such financial and technical assistance and take title to such property as may be offered under the technical assistance programmes of the United Nations, specialised agencies, friendly governments or other organisations.*

Following the changes of 1975 in three of the member States, the

Table IV.A.3

HYDROLOGICAL CHARACTERISTICS OF THE TRIBUTARY BASINS

Tributary Basin	Drainage area (km2)	Annual flow (106m3)	Annual flow (m3/s)	Annual runoff (mm)	Natural low flow (m3s)
Se Kong	28,500	32,200	1,368	1,130	40
Se San	17,100	17,300	547	1,010	28
Sre Pok	29,450	29,800	942	1,010	118
Prek Preah	1,510	760	24	505	3
Prek Krieng	2,450	1,240	29	505	5
Prek Kampi	1,150	580	18	505	2
Prek Te	4,170	2,530	80	610	10
Prek Chhlong	5,750	2,910	92	505	3
Stung Chinit	4,130	1,360	43	330	3
Stung Sen	14,000	6,190	196	440	8
Stung Staung	1,900	840	27	440	1
Stung Chickreng	1,030	450	14	440	1
Stung Streng	3,210	1,140	36	355	1
Stung Sisopon	4,310	1,900	60	440	2
Stung Mongkol Borey	2,700	1,980	63	730	3
Stung Battambang	2,135	1,960	62	920	3
Stung Pursat	4,480	1,660	52	370	1
Prek Thnot	5,050	1,560	49	310	1
Mekong at Kratie	646,000	441,600	13,974	680	1,750

Interim Mekong Committee was set up in 1978 comprising Lao PDR, Thailand and SR of Viet Nam. Staff of the Mekong Secretariat have established dialogue with NGOs working in Kampuchea to prepare for Kampuchea's resumption of its place in the Mekong Committee.

c. Large scale projects under review by the Mekong Committee

Under the auspices of the Mekong Committee, a number of projects were studied prior to 1975, and some wholly or partially completed. Tributary projects studied at feasibility or pre-feasibility level include those at Battambang and Stung Chinit. The Prek Thnot project was under construction but had not been completed. The North Phnom Penh Polder was substantially completed. Projects within the Mekong Basin studied at desk level include those shown in Table IV.A.4. This table includes Sambor, Stung Treng, and Tonle Sap which are considered large projects that may be built over the long term.

It should be recalled that up to the 1970s, the environment, natural and human, was not the issue which it is now. The problems of resettlement are now more apparent. The fact that people have a time-honoured attachment to their ancestral areas, to their village chiefs, and to the land that they and their ancestors have farmed for long periods in the past; and that they have a deep religious respect for these same ancestors, who may be buried nearby, are all important considerations in making decisions on further development. Furthermore, while focusing on the potential of the Mekong River to provide electric power and irrigation water to the four riparian states, the consequences of such work on natural processes such as fish and prawn life cycles should also receive more attention than in the past.

Table IV.A.4

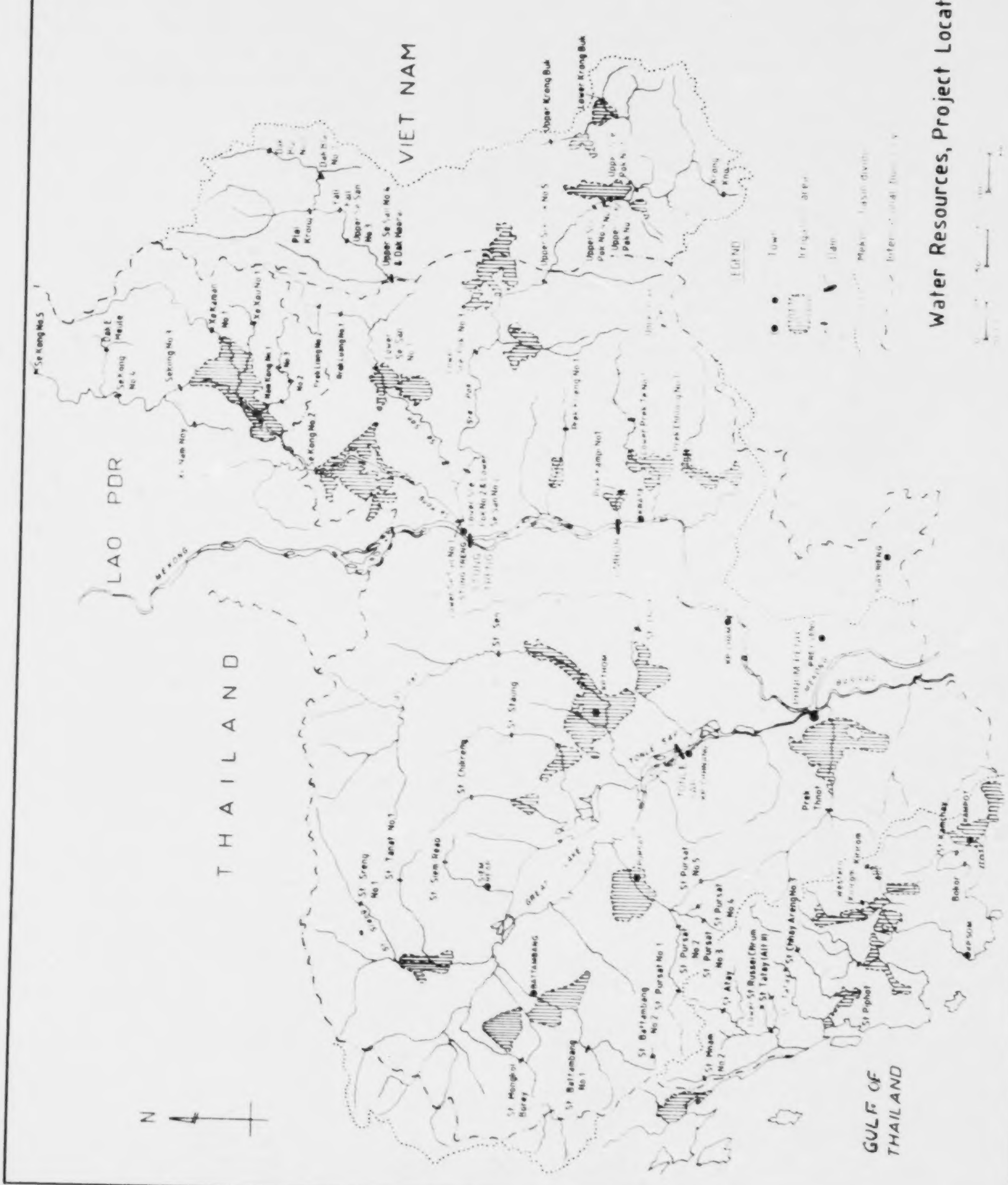
HYDRO POWER/IRRIGATION PROJECTS STUDIED AT DESK LEVEL

Project	Basin	Inst. cap. (MW)	Power gen. (GWh/yr)	Irrigation potential (ha)
Sambor	Mainstream	3,600	18,000	34,000
Stung Treng	Mainstream	7,200	35,150	-
Stung Atay	St. R. Chrum	110	559	25,000
Nam Ou No. 2	Nam Ou	950	4,718	-
Upper Se San No. 4	Mainstream	350	1,720	-
St. Battambang No. 2	St. Battambang	36	178	-
St. Pursat No. 1	St. Pursat	75	379	12,000
Prek Liang No. 1	Se San	55	282	-
Upper Sre Pok No. 5	Sre Pok	235	1,171	-
Lower Se San No. 3	Se San	400	1,991	57,000
Prek Liang No. 2	Se San	40	202	-
Lower Sre Pok No. 3	Sre Pok	345	1,736	65,000
St. Pursat No. 2	St. Pursat	17	86	13,000
Stung Sen	Stung Sen	40	200	130,000
Upper Prek Te	Prek Te	15	73	-
O Phlai	Sre Pok	5	26	-
Prek Por	Sre Pok	17	86	-
Prek Rwei	Sre Pok	7	34	-
Ya Hleo	Sre Pok	-	-	28,500
Ya Lop	Sre Pok	-	-	18,500
Prek Chbar	Sre Pok	-	-	26,000
Prek Drang	Sre Pok	-	-	14,000
Prek Santai	Sre Pok	-	-	6,000
Prek Kriang	Prek Kriang	-	-	10,000
Prek Kampi	Prek Kampi	-	-	7,000
Lower Prek Te	Prek Te	-	-	30,000
Prek Chhlong	Prek Chhlong	-	-	24,000
Stung Staung	Stung Staung	-	-	20,000
Stung Chickreng	St. Chickreng	-	-	10,000
Stung Sreng	Stung Sreng	-	-	25,000
St. M. Borey No. 1	St. M. Borey	-	-	10,000
Stung Pursat No. 3	Stung Pursat	-	-	2,800
Stung Pursat No. 4	Stung Pursat	-	-	5,900
Stung Pursat No. 5	Stung Pursat	-	-	3,400
Pursat weir	Stung Pursat	-	-	3,400
Tonle Sap	Mainstream	-	-	-

Source: Interim Mekong Committee Secretariat

The southwest part of Kampuchea experiences heavy rainfall and has been studied by the Committee, even though

Chart IV.A.II


LAO PDR
THAILAND
VIET NAM
GULF OF THAILAND
MEKONG
GREAT LAKE
LEGEND
Town
Irrigation area
Dam
Mekong basin divide
International boundary
Se Kong No 5
Se Kong No 4
Sekong No 3
Se Kong No 2
Xe Nam Noy
Xekaman No 1
Xe Kaman No 1
Nam Kong No 1
Prek Liang No 1
Prek Liang No 2
Lower Se San No 1
Upper Se San No 1
Upper Se San No 4 & Dak Mepra
Yali Falls
Plei Krong
Upper Krong Buk
Lower Krong Buk
Upper Pok No 1
Prek Chhlong No 1
Lower Prek Te No 1
St Sen
St Staung
St Chikreng
St Sreng No 1
St Taref No 1
St Siem Reap
St Mongkol Borey
St Battambang No 1
St Battambang No 2
St Pursat No 1
St Pursat No 2
St Pursat No 3
St Pursat No 4
St Pursat No 5
St Atay
St Russei Chrum
St Tatay
St Chhay Areng No 3
St Piphot
St Mnam No 2
Prek Thnot
Kirirom
Bokor
Kampot
BATTAMBANG
TONLE SAP

Water Resources, Project Location

It lies outside the Mekong basin proper. Several possible irrigation and/or hydro-power projects have been identified, which are summarised in Table IV.A.5. The location of all these projects is shown in Chart IV.A.ii. Further attention to some of these would be warranted if there are now population centres nearby.

Projects recommended for early attention are Prek Thnot, Kirirom, Kamchay, Stung Atay, Battambang, Bovel and Stung Chinit. A brief description of these follows:

The Prek Thnot is a multi-purpose project designed to provide an average annual output of 50 million kWh from an installed capacity of 18 MW, an effective storage capacity of 670 million m^3, irrigation for 5,000 ha (first stage), flood control and other benefits. The irrigation system was to be extended progressively to 18,500 ha (second stage) and 70,000 ha (final stage) in Kompong Speu, Kandal and Takeo provinces.

Following appeals by the Mekong Committee and the Secretary-General of United Nations, financial assistance totalling US$20 million was obtained from 12 countries and the UNDP. Kampuchea itself provided another $9 million in local currency. This finance was to cover construction of the first phase of the project including:

- main dam with overall length of 10 km which will provide a net storage capacity of 980 million m^3 covering an area of 196 km^2;
- power plant with two generators of 9,000 kW each;
- diversion weir located 12 km downstream of the reservoir;
- irrigation network of 5,000 ha on the left bank of the river; and
- transmission line from the power plant to the existing transmission line between Phnom Penh and Kirirom.

Construction began in 1969, and work on the main dam had been 20 percent completed

Table IV.A.5

PROMISING WATER RESOURCES PROJECTS IN KAMPUCHEA OUTSIDE THE MEKONG BASIN

PROJECT	Catchment Area km2	Gross Storage 106m3	Average Net Head m	Average Energy At Load Centre GWh/yr	Firm Energy At Load Centre GWh/yr	Inst. Cap. MW	Irr. Area 1000 ha
Stung Mnam No. 2	430	470	209	443	350	90	20.0
Stung Atay diversion	550	645	261	558	440	110	25.0
Middle							
Stung Sala Munthun diversion	103	66	-	-	-	-	
Stung - River A diversion	155	93	-	-	-	-	-
Russei - Middle Stung Russei Chrum storage dam	474	275	218	634	345	125	
Chrum							
Lower Stung Russei Chrum	1,570	21	103	401	169	80	-
Stung Tatay project (Alt II)	563	609	180	395	318	80	-
Stung Chhay Areng No.3-Stung Kampong Saom Diversion	950	1,750	163	1,290	1,050	260	39.0
Stung Piphot (Alt II)	1,010	2,810	30	133	86	25	32.5
Western Kirirom Plateau	105	40	283	67	48	13	2.4
Prek Kampong Leu	580	240	-	-	-	-	12.0
Bokor Plateau	24.5	27	885	140	93	28	1.5
Stung Kamchay	685	720	117	428	301	85	35.0

before it was interrupted in 1971. Other work continued and the diversion weir was operational on 31 May 1973. In addition, part of the main irrigation canals had been constructed which would enable the irrigation of 300 ha. Also the whole irrigation network was completed for 100 ha of land which were distributed to farmers for dry season cropping.

A re-appraisal study of the project is required to establish its costs and benefits given that in the 20 years since construction was started there has been development in the area to be irrigated (e.g. the "Pol Pot canals") and Phnom Penh's requirement for electric power has changed. The study is estimated to cost US$1 million. Its output will include recommendations on the 10 MW Kirirom hydro project which was in operation until 1970 and whose transmission line to Phnom Penh was to also serve Prek Thnot.

Kamchay was investigated by a USSR team in the 1960s and some construction is understood to have been done. 85 MW was to be the installed capacity. This hydro project must be considered a serious possibility as a contributor to the Kompong Som to Phnom Penh area electricity supply system and its re-appraisal is recommended. Such a study would take eight months and cost US$500,000.

Stung Atay is a 110 MW hydro project which would divert water through the Cardamones mountains to the Stung Pursat basin. It would provide power for Phnom Penh and irrigation water to the Pursat basin. It is recommended that river flow measurements be made and a geological and topographical reconnaissance be carried out to investigate whether this is a medium-term prospect for power supply for Phnom Penh.

Primarily an irrigation project, the Battambang project would also supply hydropower to Battambang and Siem Reap. Gravity irrigation of 37,000 ha is envisaged. A planning study is recommended as a first step. This would take one year and cost US$1 million. It would confirm the proposed size of the powerhouse (24 MW) and plan the further activities to complete the project.

The Bovel irrigation project would supply water to enable 10,000 ha to be irrigated during the dry season and 45,000 ha in the wet season. Irrigation has been used in the project area since 1926. A feasibility study is required as a first step. This is estimated to cost US$1 million. If implemented, a further $3 million for design and documentation and $63 million for construction will be required.

The Stung Chinit project combines irrigation, flood control and rural electrification and it could serve as a model for other tributaries of the Great Lake. It has been studied previously in detail. A re-appraisal study is required as a first step. This would take one year and cost $500,000.

In addition to the above priorities, the following projects have been under consideration by the Mekong Secretariat.

Lower Se San. If the Stung Treng project on the Mekong mainstream is not built, then three projects are possible in the lower Se San. If the Stung Treng project is eventually built, the No. 3 would be possible. The features of the two projects they could be built in the absence of the Stung Treng project are available in the Secretariat's data bank.

Lower Se San No. 3. The 400 MW lower Se San No. 3 project consists of a 75 m high dam with a crest length of 4,300 m with the powerhouse at its toe. The reservoir of this project would have an FSL of 150 m +MSL, a gross storage of 27,400 million m^3 and a net storage of 3.120 million m^3. A regulated flow of 500 m^3 and a net head of 58.5 m would enable the generation of 1,991 GWh/year. A part of the flow could be diverted to irrigate 57,000 ha of land on both banks of the Se San, downstream of the dam. At full development, the irrigation diversions would decrease power production by 6 percent.

Prek Liang No. 2. The 40 MW Prek Liang No. 2 project would have a 90 m high dam with a crest of 250 m and would impound a reservoir with an FSL of 515 m +MSL, a gross storage of 240 million m^3 and a net storage of 180 million m^3. The regulated flow of 17.7 m^3 would be diverted through a pressure tunnel and a penstock to the powerhouse located downstream in the Prek Liang valley. The net head would be 168 m and the power generation 202 GWh/year.

Prek Liang No. 1. The 55 MW Prek Liang No. 1 project was proposed downstream of the Prek Liang No. 2 project. This scheme would have a dam with a height of 90 m and a crest length of 300 m, which would form a reservoir with an FSL of 330 m + MSL, a gross storage of 190 million m^3 and a net storage of 110 million m^3. Assuming that the Prek Liang No. 2 exists upstream, the regulated flow would be 27.2 m^3 which would be diverted through a tunnel and penstock to the powerhouse on the shore of the river downstream. The average net head would be 153 m and the power generation 282 GHw/year.

4. Short to Medium Term Solutions

a. Introduction

At present, what is most needed, especially in rural areas, is water: clean water for drinking and water for crops. Many canals and dikes are damaged or do not function at all. Consequently, very little water is controlled for agricultural use. A major source of such water is from groundwater. This is first discussed, followed by other short term measures.

b. Groundwater

Ground-water resources have not been adequately studied. Records are not available of village wells which were constructed in the 1950s and 1960s. It is believed that most of these are now unusable and that local preference is to use streams and ponds for domestic water. This is causing a widespread health problem. Well water should be provided to communities who lack access to treated water.

The Stung Chinit feasibility study identified two aquifers in the project area (432 km^2) around Kompong Thmar. One is a porous lateritic layer immediately under the top soil, and the other is composed of sandy and gravelly deposits of alluvium in the low lands below elevation 20m +MSL. The specific yield of the aquifers is small, approximately 15 m^3/day/m (lateritic strata) and 50 m^3/day/m (sandy layer), or 260-800 m^3/day/km^2 assuming that the draw-down is 5 m and the influence radius is 300 m.

The aquifers incline towards the west (Tonle Sap direction) and have a high electric conductivity: 90-1,050 (at 18°C) micro-ohm/m^3 which correspond to salt contents around 0.00014-0.61 percent. The water is generally easily accessible. It lies only 1-2 m below ground in the rainy season and hardly exceeding 5 m in the dry season. Farmers dig shallow wells and fully utilise the water for domestic purposes.

The above situation probably also applies to the areas around the Great Lake and along the Mekong and its tributaries down to Kompong Cham. After Kompong Cham, especially downstream of "quatre bras", groundwater is abundant since the aquifer is charged not only by rain but by inundation from the Mekong. The aquifers in Prey Veng and Svay Rieng provinces continue to Dong Thap province in Viet Nam, where (in Sarai) a sand aquifer at a depth 25-40 m yielding about 170 m^3/day/m has been identified. The aquifer inclines slightly towards the south.

In the southern provinces, i.e. Kandal, Takeo and Kampot in addition to the above two provinces, groundwater development for irrigation could be promising. A pilot scheme of ground-water pumping for irrigation, say 30 ha, for each of above-mentioned provinces is recommended to verify technical and economic viability. For five pilot schemes, about US$800,000 including equipment and technical assistance/training may be required.

c. Pumps and deep wells

From the early 1980s, a number of NGOs have been working in this field. For instance, OXFAM/MIRC/JVC built 40 dispensaries in Takeo province and provided a deep well and pump at each. OXFAM distributed 2,000 irrigation pumps. Assistance to the construction of small-scale irrigation projects was provided by CARE, CWS, MCC, AFSC, CIDSE, etc. (as well as FAO). UNICEF has carried out a drinking water supply program.

Since 1979, NGOs have provided a very large number of small, portable irrigation pumps for use in areas which have adequate water available. A more extensive use of this type of pump is foreseen as the rural economy develops and more farmers are able to purchase or rent irrigation pumps.

The development of ground water in the southern provinces should be successful. For the rural areas, there should be a continuing activity of excavating wells, water testing, and well exploitation for drinking water. Depending on the demand, the supply and depth of water there will be a need for hand pumps or motorised pumps – initially diesel or petrol driven, but electrically where practicable.

For small-scale irrigation, pumping of nearby available water is the way to proceed. Inherent problems of operation and maintenance, as with all machinery, have to be planned for. These include the use of correct lubricants and fuel and the operation and maintenance by sufficiently skilled personnel who have access to spare parts. There is a great demand for water pumps; hence the need to train numbers of operation and maintenance personnel.

Effective water management is a serious constraint to increased food production. While large-scale irrigation works are of obvious value, the lack of capital, of trained hydrologists, engineers and of other skills, of earthmoving equipment and of large pumps has inhibited the development of large-scale works. It is recommended that water resources development efforts are immediately directed to small-scale irrigation and the rehabilitation of previously operating projects. The completion of projects which were underway in the early 1970s should be seriously considered. The training of technical manpower must be accorded equally high priority.

d. Rehabilitation of the "Pol Pot canals"

During the 1975–1978 period, a large number of canals and water control structures were built by manual labour. The works usually followed the one-kilometre grid lines on topographic maps and little attention was given to the slope of the land or to drainage. As a result, many of these works either failed or adversely affected existing irrigation works. Poorly designed dams and earthworks resulted in many of the structures being destroyed by flooding or erosion. It is estimated that less than 30 percent of the structures built during this period are useable.

A number of NGOs have been involved in the restoration or re-adaptation of these irrigation works as well as in the construction of new small-scale schemes. In some cases, food-for-work has been used to pay for the labour.

The population is dedicated to using the canals and structures because of the enormous effort many of the same people had put into their construction. In spite of the enthusiasm for rehabilitation and reconstruction, the only proper way to proceed appears to be to survey the present situation, to develop plans which take into account the available water, and from these, study the benefits of rehabilitation/restoration. Should it be decided to use the grid pattern by integrating drainage and irrigation systems in a limited area, key factors that should be considered are:

- comparisons with alternative approaches;
- whether the system is operationally sound;
- whether there is adequate water; and
- what the cost is likely to be of any necessary land-levelling works.

e. Recent small scale irrigation works

Since 1979, a number of small and medium-sized irrigation projects have been constructed or restored, including the Kompong Sne Dam in Prey Veng which permits irrigation of 6,000 ha both in the wet and dry seasons. The Tuk Thla dam in Kandal now irrigates 8,200 ha near Phnom Penh. Dams at Phdao Chum in Kompong Cham and O Kraing Ambel in Kompong Speu each provide irrigation water for 4,000 ha of land. Other irrigation projects known of include the Kompong Puoy dam in Battambang, the Roliang Chrey dam in Takeo, the Chinit dam in Kompong Thom, the Krapeu dam in Siem Reap, the Bang Kyar canal in Kandal, the Tonli Bati reservoir in Takeo, the Por Los dam in Prey Veng and the Anlong Ka and the Kompong Tuol water-control systems outside Phnom Penh.

According to one source, there were 2,286 irrigation projects at the end of 1987 including reservoirs, dams, dikes and pumping stations capable of providing supplementary irrigation water to some 371,000 ha of rice fields (268,000 in the wet and 103,000 in the dry season). There are currently some 4,500 small, portable irrigation pumps although only 30 percent are in good working condition. At present, they irrigate about 8,000 ha.

Since 1979, the Ministry of Agriculture has been assisted by NGOs in developing irrigation schemes and this work is continuing. Assistance is required in these ongoing activities as well as in maintaining the schemes already in operation.

f. Other river works

Adjacent to the perennial rivers, control structures on some side streams can be used to form reservoirs, which can be supplied by pumping from the rivers. They also help to mitigate annual flooding. The Huai Mong in Nong Khai province, Thailand, is a typical example of the action of these regulator/pump projects.

In the case of the Huai Mong, it is a tributary of the Mekong river, with a catchment area of 2,662 km^2 flows into the Mekong at Tha Bo, Nong Khai province. During the rainy season, the Mekong has several flood peaks when water levels are often higher than that of the Huai Mong at its confluence with the Mekong. The Mekong flood waters intrude into the Huai Mong basic through the river channel and cause a vast flooding in the back-swamp area of the basin. Farmers plant rice in the lowlands, expecting no serious flooding, and often lose the crop due to damage by severe floods. They try to recover by planting a second rice crop in the dry season, pumping water from the Huai Mong, but the dry season flow is very low. A regulator built at the tributary river mouth is an effective way to solve both problems, i.e. protecting the basin from intrusion of flood water by closing the regulating gate, and storing water in the reservoir along the river channel created by the regulator at the end of flood season for irrigation use (by pumping, since the reservoir water level is lower than both bank areas in general) during the dry season.

The project area is partially protected by a polder dike, and is also provided with a dual purpose pump which drains off excess runoff by pumping it back to the Mekong; and, if the reservoir is insufficiently filled during the dry season, it pumps water from the Mekong back into the reservoir for irrigation purposes.

Such a regulator with polder dike and pumping system is seen at the existing south Phnom Penh polder, involving Stung Meanchey and Pochentong, with some 3,245 ha protected. The concept of regulator/pump development was examined in the planning of the north Phnom Penh polder and Muk Kampul polder in the 1970s by the Mekong Secretariat, and might be more generally applied.

5. Development needs

a. Delta Master Plan

To establish medium to long term agricultural projects in the delta area a "master plan" study would be useful. This would take into account the annual pattern of rainfall and flooding, present land use, and indicate how land should be best used, the location of future roadways, etc. Such a study, financed by UNDP, is about to commence in the Vietnamese portion of the Mekong Delta with the World Bank as Executing Agency and the Mekong Secretariat as Associated Agency. The delta is shared by Kampuchea and Viet Nam, and the soil types are identical either side of the border. Furthermore under common law, as well as by the Statute of the Mekong Committee, no one of the four Members (Kampuchea, Lao PDR, Thailand and Viet Nam) can interfere with the flow of the Mekong without the agreement of all Members. Such a study for Kampuchea, which would be based on hydraulic models, would take into account the hydraulic regime, including the "Pol Pot canals". Its results would enable the maximum use of these structures which were built at such huge cost in terms of human labour.

b. Training

Keeping in view the requirement for a large number of trained personnel in the different fields relating to the development of the basin, the Mekong Committee has pursued from the very beginning a policy of comprehensive training for personnel from all the four riparian countries. The training programmes have been carried out in various ways: establishing regional training centres, conducting seminars, workshops and other group training courses, providing individual on-the-job training in projects, and arranging overseas training including advanced studies specially for developing the Mekong cadre. The training programmes have been supported by the UNDP, certain international foundations, and a number of co-operating countries.

Training topics have covered: hydrology, hydrography, system analysis, archaeological surveys, power-plant operation, irrigation schemes operation, agricultural extension services, agro-industries, waterborne disease control, fisheries development, resettlement planning, boat building, river piloting and a variety of other subjects. Commencing in 1960, more than 1,900 persons had received this type of training by 1975 in one form or another. Trainees came from the four riparian countries in more or less equal proportions. These initiatives will clearly have to be continued and re-inforced to provide Kampuchea with the trained people that it needs.

c. Development and maintenance of the hydrologic and meteorological network

Over the years, the Mekong Secretariat has helped member countries to develop and maintain a basin-wide network of hydrologic and meteorological stations. These supply basic year-round hydrologic and climatic data which are essential for the planning, development and operation of water resources projects.

In Kampuchea, there has been a serious interruption to data gathering and it is essential to revive these activities quickly. As a first step it is proposed to put back into service part of the previous network. Training in measurement techniques and equipment maintenance would be provided to operators. At a later stage the network should be expanded to be consistent with the overall network in the Mekong basin.

Chart IV.A.i

LOCATION OF PRECIPITATION MEASURING STATIONS

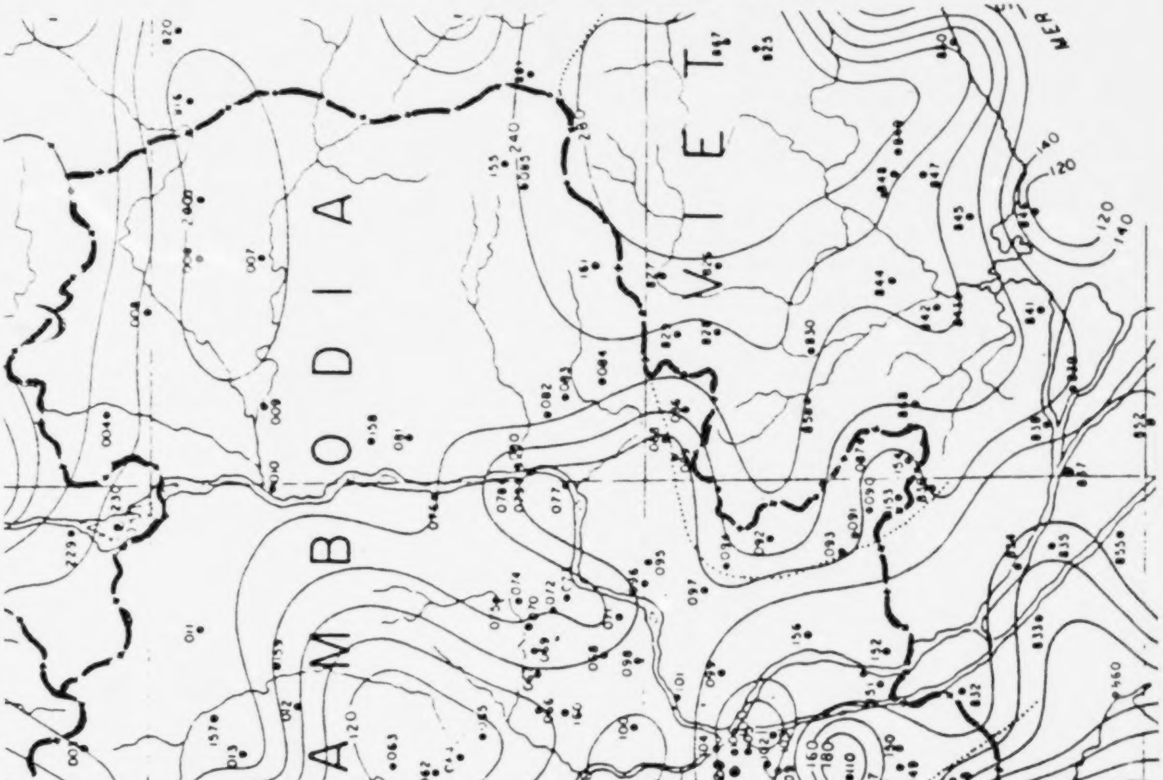

CAMBODIA
VIET
120
160
180
240
280
320
360
400
440
480
520

Table IV.A.6

PRECIPITATION AT 154 LOCATIONS

No.	Stations	Latitude N		Longitude N		Altitude N	Years of Observations	Reactivated
001	SAMRONG	14	13	103	33	22	1923-26,28-29, 51-69,71-73	1981
002	PREAH VIHEAR	14	24	104	43	100	1965-70	
003	CHEOM KSAN	14	13	104	56	100	1917-19,21-29, 42-70	
004	SIEMPANG	14	08	106	22	12	1953-70	
005	ANDONG PICH	13	41	107	15	294	1966-68	
006	BUNG LUNG	13	44	106	58	324	1962-68	
007	LOMPHAT	13	30	106	59	97	1967	
008	VOEUN SAI	14	00	106	46	220	1917-29,39-69	
009	CHRAP	13	28	106	19	117	1961-69	
010	STUNG TRENG	13	31	105	58	54	1912-44,46-70	
011	CHHEB	13	45	105	24	81	1962-70	
012	ROVIENG	13	21	105	07	56	1965-70	
013	TBENG (SDAU)	13	35	104	52	73	1965-70	
014	SASAR SDAM	13	28	103	40	10	1965-70	
015	KOMPONG KDEI	13	07	104	18	13	1964-70	
016	KOMPONG KHLEANG	13	05	104	07	10	1971-29,37-69	
017	DAMDEK	13	14	104	06	13	1963-70	
018	PHNOM KOULEN	13	35	104	04	200	1963-68	
019	ROLUOS	13	19	104	00	14	1962-68	
020	ANGKOR WATT	13	23	103	51	15	1964-70	
021	SIEM REAP	13	22	103	51	15	1917-27,29-34, 36-47,49-69,74	
022	KAUK PATRY	13	22	103	59	15	1967-69	
023	CHONG KAL	13	57	103	35	20	1962-70,72-73	
024	KEALANH	13	35	103	25	17	1918-22,24-29, 43-70	
025	PHNOM SORK	13	45	103	21	18	1950-71	
026	BATTAMBANG	13	06	103	12	18	1907-08,13-27, 29-40,52-53,57-73	1981
027	O TAKY	13	11	103	01	12		
028	VEAL TREA	13	12	103	07	8		
029	SISOPHON	13	36	102	58	16	1917-29,41-73	
030	SVAY CHEK	13	49	102	58	15	1950-73	
031	BAVEL	13	13	102	53	20	1962-68	
032	POIPET	13	39	102	33	38	1960,70-72	
033	PAILIN	12	52	102	37	170	1917-29,39-74	
034	O CHOAR	12	39	102	37	110	1962-66	
035	SRE PUNLU	12	41	102	46	180	1963-66	
036	PHNOM DAMREY	13	02	102	44	82	1962-66	
037	TEAK SAK	12	32	102	51	130	1963-68	
038	CHISANG	12	52	102	51	70	1962-67	
039	TRENG	12	50	102	55	50	1961-68	
040	CHAMLONG KUOY	12	41	102	57	70	1961-68	
041	CHAMCAR STUNG	12	36	102	55	90	1964-69	
042	KAMCHAT	12	36	102	48	166	1963-66	
043	PHNOM SAMPEOU	13	02	103	07	11		
044	BANAN	13	57	103	09	19		1981
045	PEAM PROUS	12	16	103	07	200	1960-68	
046	KOH KRALOR	12	46	103	16	22	1962-73	
047	RAING KESEY	12	58	103	15	15	1957-73	
048	TUOL KROUS	12	28	103	19	207		
049	PHUM ROUNG	12	33	103	26	28	1962-67	
050	MAUNG RUSSEY	12	47	103	27	17	1950-69	1984
051	DAP BAT	12	30	103	50	19	1952-68	
052	TALO	12	29	103	39	18	1962-70	

(cont'd)

Table IV.A.6 (cont'd)

No.	Stations	Latitude N	Longitude N	Altitude N	Years of Observations	Reactivated
053	LEACH	12 21	103 46	29	1958-71	
054	PURSAT	12 33	103 54	18	1913-34,25-67	1981
055	KRAKOR	12 31	104 11	5	1929-30,32-44, 47-53,58-72	
056	BAMNAK	12 19	104 10	10	1952-70	
057	BARIBO	12 27	104 28	13	1962-73	
058	SDOC ACH ROMEAS	12 04	104 32	10	1952-73	
059	STAUNG	12 55	104 35	12	1918-29,36-66,68-69	
060	KOMPONG CHHNANG	12 15	104 40	6	1913-14,16-29,37-74	1981
061	BENG POR	12 21	104 43	15	1963-72	
062	TREPEANG RUSSEY	12 44	104 54	13	1932-68	
063	BENG PER/CHRISTIANVILLE	12 56	104 57	4	1962-69	
064	KOMPONG THOM	12 42	104 54	13	1932-68	1981
065	SANTUK	12 31	104 59	14	1964-67	
066	BARAY	12 23	105 04	12	1917-29,34-70	
067	CHAMCAR ANDONG	12 22	105 13	86	1935-67,71	
068	PREY TOTUNG	12 03	105 16	14	1954-70	
069	CHAMCAR LOEU	12 18	105 17	116	1944-67	
070	CHAMCAR KRAUCH	12 12	105 20	19	1948-70	
071	KOMPONG CHAM	12 00	105 27	16	1917-22,26, 28-44,47-73	
072	STUNG TRANG	12 16	105 30	22	1917-29,39-70	
073	PREK KAK	12 15	105 32	22	1928-70	
074	KBAL AU SMACH	12 20	105 32	55	1965-68	
075	AU MLOU	12 27	105 36	45		
076	SAMBOR	12 46	105 58	29	1919-29,37-68	
077	CHHLONG	12 14	105 58	20	1937-68	
078	KRATIE	12 29	106 02	23	1917-26,28,38-70	1981
079	ROCAR KANDOL	12 17	106 02	23	1956-68	
080	PEAMTE	12 27	106 02	20		
081	SRE SBAU	12 56	106 10	64		
082	SVAY CHREAS	12 17	106 17	67	1962-70	
083	PREK CHHLONG	12 13	106 26	64	1933-69	
084	SNUOL	12 04	106 25	180	1962-70	
085	O RAING	12 23	107 27	900	1965-67	
086	KANTROY	11 45	106 17	210	1933-69	
087	BAVEL	11 04	106 10	5	1965-67	
088	MIMOT	11 49	106 11	210	1931-69	
089	CHALANG	11 47	106 07	210	1933-69	
090	PRASATH	11 08	105 32	6	1962-70	
091	SVAY RIENG	11 05	105 47	6	1917-30,32-35, 37-44,47-74	1981
092	KOMPONG TRACH	11 24	105 46	8	1954-69	
093	KAUK TRAP	11 08	105 41	5		
094	KAMCHAY MEA	11 36	105 40	5	1965-69	
095	SUONG	11 54	105 39	19	1917-29,34-67	
096	CHUP	11 54	105 36	21	1939-70	
097	KANCHRIECH	11 41	105 33	11	1965-70	
098	PEAM CHIKANG	11 56	105 15	14	1949-70	
099	SNAI POL	11 38	105 13	14	1949-70	
100	PEAM CHOR	11 01	105 13	6	1962-67	
101	PREK TAMEAK	11 45	105 02	13	1963-70	
102	PHA AO	12 02	104 59	14	1954-70	
103	SET BO	11 26	105 01	10	1962-73	
104	PREK LEAP	11 35	104 55	10	1951-72	
105	PETIT TAKEO	11 32	104 55	10	1953-70,72	
106	PHNOM PENH (VILLE)	11 36	104 50	11	1962-66	1984
107	KOMPONG KANTUOT	11 32	104 44	13		
108	PHNOM PENH	11 33	104 51	10	1907-44,46-74	1981
109	TAKHMAU	11 26	104 58	10	1955-71,73	
110	BAT ROCAR	11 08	104 47	8	1956-70	

(cont'd)

Table IV.A.6 (cont'd)

No.	Stations	Latitude N	Longitude N	Altitude N	Years of Observations	Reactivated
111	KOMPONG TRALACH	11 54	104 46	10	1917-29,35-73	
112	OUDONG	11 47	104 44	12	1962-73	
113	CHHAK CHHOEU NEANG	11 30	104 46	10	1964-68	
114	TRAMKHNAR	11 16	104 42	11	1962-70	
115	THNAL TETUNG	11 29	104 40	10	1964-73	
116	SRANG	11 17	104 17	67	1964-67	
117	KOMPONG SPEU	11 26	104 31	34	1917-29,31-73	
118	CHOCUNG ROAS	11 39	104 33	37	1964-70	
119	PHNOM SROUCH	11 22	104 22	55	1962-71	
120	AMLEANG	11 47	104 21	70	1964-69	
121	SRE KHLONG	11 18	104 18	58	1963-67	
122	TUOL KHPOS	11 57	104 23	85	1962-73	
123	SLAKOU	11 05	104 43	12	1952-70	
124	SANGKER SATUB	11 38	104 08	76	1964-69	
125	STUNG CHRAL	11 11	104 04	30	1968-70	
126	KIRIROM	11 19	104 02	680	1964-70	
127	SRE AMBEL	11 07	103 47	1	1958-70	
128	PROK ANGKUNH	11 27	103 27	2		
129	KOH KONG (VILLE)	11 38	103 00	1	1959-74	
130	CHAMLANG KOR	10 53	103 21	1		
131	SIHANOUKVILLE	10 38	103 29	13	1957-74	
132	TUK SAP	10 35	103 38	5	1968-70	
133	VEAL RINH	10 42	103 48	50	1964-70	
134	TUK LAAK	10 40	103 55	50	1964-70	
135	BOKOR (VILLE)	10 36	104 03	1050	1941-68,70	
136	BOKOR/FERME P.SIHANOUK	10 37	104 04	950	1939-69	
137	KAMPOT	10 37	104 13	1	1907-08,12-39, 41-44,57-73	1984
138	CHAKREY TING	10 41	104 15	9	1958-69	
139	KEP MONASTERE	10 28	104 18	2	1964-73	
140	KRAING LEAV	10 44	104 24	36	1965-66	
141	KOMPONG TRACH	10 33	104 28	4	1917-29,35-67,70	
142	CHHOUK	11 06	104 41	14		
143	RUSSEY SROK	10 26	104 28	3	1964-69	
144	TOUK MEAS	10 39	104 33	12	1964-70	
145	TANI	10 46	104 39	20	1964-70	
146	ANGTASSOM	10 00	104 41	12	1950-70	
147	TAKEO (VILLE)	10 59	104 48	6	1960-70	1984
148	KIRIVONG	10 36	104 44	7	1935-72	
149	CHIKHMAR	10 49	104 48	6	1962-66	
150	ROMINH	10 48	104 58	6	1964-69	
151	CHREY THOM	10 57	105 04	6	1949-70	
152	KOH SOMPEOU	10 54	105 15	5	1966-67	
153	KAMPONG RAU	10 55	105 56	5	1956-69	
154	CHANTREA	10 52	106 04	5	1965-70	

Table IV.A.7

AVAILABILITY OF HYDROLOGIC DATA IN KAMPUCHEA

Note: G = Gauge height data; Q = Discharge data

River	Station	Data	Period	D.A (km2)	Max GH(m)	Max Q(m3/sec)	Mean Q(m3/sec)	Min GH(m)	Min Q(m3/sec)	React-ivated
Mekong	Stung Treng	Q	1924-69	635,000	12.00	65,700	13,380	-	-	
Mekong	Kratie	Q	1924-69	646,000	23.00	66,700	13,970	4.67	1,250	1980 (G)
Mekong	Kompong Cham	Q	1964-73	660,000	15.44	57,000	13,660	1.74	-	1981 (G)
Mekong	Phnom Penh	Q	1960-73	663,000	11.08	49,700	13,130	1.66	1,250	1981 (G)
Mekong	Chrui Ampil	G	1971-73	-	-	-	-	-	-	
Mekong	Dey Eth	G	1971-73	-	9.98	-	-	-	-	
Mekong	Neak Luong	G	1962-73	-	7.81	31,700	-	-	-	
Se Kong	Siempang	Q	1965-68	23,500	-	-	-	-	-	
Se Kong	Ban Khmuon	Q	1960-68	29,600	8.78	10,800	1,350	0.53	77.0	
Se San	Voeun Sai	Q	1963-68	16,300	10.25	4,380	-	3.15	75.0	
Se San	Ban Komphun	Q	1960-68	48,200	11.13	12,600	1,560	0.89	100	
Sre Pok	Lomphat	Q	1963-69	25,600	16.70	5,600	-	2.10	17.5	
Stung Sen	Kg Putrea	Q	1963-69	9,080	11.98	1,640	-	1.79	0.74	
Stung Sen	Kg Thom	Q	1962-70	14,000	11.26	1,060	183	2.81	1.77	1981 (G)
St Sangker	Treng	Q	1961-73	2,140	9.87	1,730	70.4	-	-	
St Sangker	Battambang	Q	1961-73	3,230	8.38	800	-	0.86	1.46	1981 (G)
St Pursat	Taing Luoch	Q	1964-69	2,080	13.13	722	26.5	1.80	0.30	
St Pursat	Pursat	G	1961-73	4,480	5.35	-	-	0.02	-	
Tonle Sap	Prek Kdam	Q	1960-73	84,400	8.14	12,500	-	-	-	
Tonle Sap	P.Penh Port	G	1913-73	-	10.62	-	-	0.14	-	
Bassac	Phnom Penh	Q	1964-74	-	10.93	8,370	-	-	-	1980 (G)
Prek Thnot	Anlong Touk	Q	1963-70	3,650	7.57	500	-	0.01	0.09	
Tonle Sap	Kg Chhnang	G	-	-	-	-	-	-	-	1981

B. ENERGY

1. Introduction

The dependence on imported oil for all electricity generation points to the urgency of using alternative domestic energy resources. Although prospects do not seem to be very promising, a review of the results of prospective activities undertaken in the 1960s for indigenous oil, gas, and solid fossil fuel seems called for. As already noted, hydro power prospects seem to be much better.

2. Oil and Gas

Kampuchea was one of the first countries in the region to claim continental jurisdiction both internally and at the international level. It passed domestic legislation in 1957, and ratified the Continental Shelf Convention in 1960.

Kampuchea is also a member of the Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP). A search has been made of CCOP publications, which refer to earlier exploration activities in Kampuchean waters. The first offshore exploration commenced in 1969. In 1970, 2,880 line kilometres of seismic work had been completed by the French petroleum firm Elf, which drilled a well in 1972 to a depth of 2,437 m. It was rumoured to bear oil and gas in the upper levels, but a further search of relevant papers would be necessary to confirm or deny this.

Exploration inland has revealed little or no prospect of petrocarbons in the area of the Tonle Sap, but there may be a possibility of deposits along the axis of the lake close to both the Thai and Vietnamese borders.

In view of Kampuchea's present total dependence on imported fuels, the presence of commercially exploitable quantities of oil and gas should be investigated. It is proposed as a first step, that a literature survey be carried out and discussions held with the organisations who did the early work. The recommendations of this survey might well be to undertake further exploratory surveys.

Companies known to have participated in the early explorations are ELF, ESSO, Marine Associates and Canadian Reserve. Viet Nam and Russia may have done some work in recent years.

It would be beneficial if Kampuchea could send a few people to the training programmes conducted under the auspices of CCOP.

3. Coal, Anthracite and Lignite

Numerous indications of coal are known in the country, but no immediately exploitable seams have been discovered. During 1958-1961, a mineral survey mission reported indications of coal in the following localities:

- Permo-carboniferous of Bos Dambang (Kampot province);
- Triassic (Rhaetic) of Chhep, Sokream and Phnom Ker (Kompong Thom province);
- Triassic (Rhaetic) of Sre Roneam and Phnom Khonpuh (Kratie province);
- Liassic of Ban Voeun-Nhung and Ban Talat (Stung Treng province; and
- Permian of Phnom Sampou (Battambang province).

Special emphasis was placed on a search for coking coal suitable for metallurgical applications. At all except one of the above-mentioned localities, the variable quality of the coal and/or the small size of the deposit ruled out any possibility of exploitation. The one exception is the deposit at Ban Talat, in the Se San valley 30 km southwest of Voeune Sai.

Analysis of Ban Talat Coal
(No. of samples not known)

Caloric value:	7,600-8,100 cal/gm
Volatiles:	average 30.2%
Ash:	average 37.5%
Sulphur:	0.71 - 3.44%

Later investigations have shown that the Ban Talat coal seams occur in the Lower-Middle Jurassic part of a thick Triassic-Jurassic sequence of shales and sandstones. The sequence forms a shallow basin which covers an area of some 25,000 km^2 in the northeast, mainly on the eastern side of the Mekong in Stung Treng province. Some 27 individual coal seams, mostly thin, have been identified in the Jurassic of the Stung Treng basic and there are said to be reserves of 7 million tonnes. However, it is not certain that the seams are of exploitable thickness and geometry.

There are no known deposits of lignite.

4. Electricity Supply

All of Kampuchea's present power generators are fuelled by imported oil. Some of the "groups" (motor plus generator) have been in service since 1925. In general the demand exceeds the capacity of the power stations, and the reticulations are unsafe and unreliable. The systems lack spare parts, materials and tools for repairs and maintenance.

A number of enterprises, including factories, have their own stand-by power stations. In Phnom Penh, their capacity in 1982 totalled some 20 MW. Distribution lines are in a bad state, but they do function. There is an urgent need to "patch up" these lines by replacing component parts as and when they break down.

The power supply systems are disoriented by numerous illegal connections. These are potentially dangerous, they imbalance the power system and measures should be initiated to regularise them or remove them. However, there is a shortage of skilled personnel, and technical assistance is required to increase the skilled work force by providing "on-the-job" training.

Studies have been made on a transmission line system appropriate to the needs of the country. In plans involving the future hydro development of the immense resources of the Mekong river, Phnom Penh would be interconnected with Bangkok and Ho Chi Minh City. In the shorter term it was planned to connect Kompong Som and Phnom Penh. The only line which was constructed in the country was a connection, 120 km long, between Kirirom and Phnom Penh. This line has, for the most part, been removed.

The Asian Development Bank had a project in the early 1970s known as the Phnom Penh Perimetral Transmission Line. This was not completed. Its purpose was to reinforce the link between the city's power stations and to connect with the existing line from Kirirom and Prek Thnot. It would also have connected with the proposed line via Kampot and Kamchay to Kompong Som. It would be desirable to re-appraise this project and, if feasible, complete it. A considerable amount of basic information is available in Phnom Penh and with the Snowy Mountain Engineering Corporation (SMEC) of Australia, the consultant for the original project.

In 1982, two French engineers undertook a study of the physical status of the electricity supply systems of Phnom Penh and four smaller cities. This study was sponsored by an NGO (the Ordre Souverain de Malte). The mission report contains a very detailed review of the status at that time of the generators, the transformers and the distribution systems for all five cities. Although some improvements have since been made to these systems, this study represents a yardstick against which future reviews should be measured.

The study is, however, entirely technical and contains no estimates of future demand for energy, either in Phnom Penh itself or in the country outside. It is understood that such a study will be undertaken in connection with the feasibility studies for Prek Thnot. It would be essential input to any future energy planning for the country as a whole.

As Phnom Penh and Kompong Som are likely to develop as major users of electricity it is suggested that Kompong Som is the economical site for a major power station that uses imported fuel. A loop transmission line would connect the two and also serve the towns and industry, e.g. Chakrey Ting, between the two. This looped line would take hydro-power from Kamchay, Kirirom and Prek Thnot.

Phnom Penh would retain some power stations but more for emergency (stand-by) use.

a. Phnom Penh

There are four power stations operated by Electricite du Kampuchea (EDK) - Centrales: 1, 2, 3 and 4 situated at, or known also as, Phsar Tauch, Chak Angre, Pet Louksang and

Khmero-Sovietique (also at Phsar Tauch).

The 1982 NGO mission considered that the overhead cable system was relatively satisfactory, but the condition of the subterranean system was much more serious due to an absence of plans indicating the location of underground cables, the consequent difficulty in localising faults, and the general lack of equipment to maintain and repair the network. It is not known the extent to which this general situation has changed over the intervening years, but reports from other sources indicate that although the supply of electricity has improved, few improvements have been instituted in the distribution system as such. Indeed, this system was the subject of two UNDP projects in the early 1970s.

Central 4 is at present being enlarged to take a further five 3,000 kW groups from USSR which are expected to be commissioned in 1990 and 1991. It is understood that discussions have been proceeding with Czechoslovakia about sponsoring a large thermal station with generators being commissioned in 1993, 1994 and 1995.

The present demand on EDK's system is estimated to be 36 MW. EDK's present reliable supply is 23 MW.

Year	Demand (mw)	Available (mw)
1989	36	23
1990	41	26
1991	48	20
1992	56	27
1993	64	43
1994	71	70
1995	78	90

The above table provides an estimate of the present and possible future demands upon the system in Phnom Penh, and a projection on the supply side. Both figures are in megawatts: the supply side shows an increase for 1994 based on the assumption that Prek Thnot will come on stream then.

Development needs

To overcome immediate difficulties in the city, the following measures should be taken as soon as possible:

- The addition/substitution of several 2,100 kW General Motors compact generators. It is understood that these could be slotted in without complex installation difficulties.

- The acquisition of spare parts, and replacement assemblies to renovate or to replace the existing groups that are worthwhile either retaining or replacing in their present locations.

- Advancement, if possible, of the commissioning date of five additional USSR 3,000 kW groups at Central 4.

In the short term:

- A large (60-90MW) thermal power station using fuel oil is required. The planning and design of this station should begin now. Its location might be Kompong Som. Its introduction into the system would permit the older and smaller stations to be phased out or placed on stand-by as appropriate;

- The proposed 110kV line around Phnom Penh should be completed. This would eventually be connected to Prek Thnot, Kirirom, Kamchay, with a line to the towns around the Great Lake.

In the medium term, a transmission line is required to link Phnom Penh with Kamchay and Kompong Som.

b. Kompong Cham, Pursat, Battambang and Siem Reap

These cities were also visited by the 1982 NGO mission and their power generation and distribution facilities at that time are described in the mission report.

Since that mission, a new 2,000 kW station has been established in Siem Reap and 1,400 kW stations in Kompong Cham and Battambang.

c. Other Towns

There is no information available about the present condition of the electricity supply in the majority of these towns, however, it can be assumed that there has been general deterioration or destruction of whatever installations there were.

To meet the urgent needs to re-establish some form of reliable service, it is suggested that a number of generators and a quantity of distribution materials be ready for quick installation as and when needed. These might be installed at places of obvious need while studies are made for the short- to medium-term needs.

Technical assistance would be provided to install the units and distribution systems and to make the studies.

Generators proposed are: five of 400-500 KW capacity; and five of 400-300 KW capacity.

The auxiliary equipment required would include fuel tanks, switchboards, transformers, switchgear, insulators, conductors, power poles etc.

d. Mini Hydro-Power

Kampuchea's towns and villages in remote areas which are near dependable streams could be provided with electric power produced from mini- or micro-hydro installations.

A desk study of rainfall and stream flow records would identify promising areas. These would then be examined on the ground, the local populations consulted about the reliability of stream flow, and sites selected.

e. Conclusions

Since the prospects of discovering hydrocarbons within Kampuchean territorial limits do not seem to be very great, further work on this should probably be accorded a comparatively low priority. Of much higher priority is that of developing the hydro-electric potential of the country, at first on a local scale, together with assistance in upgrading power supplies in the urban areas.

Before 1970, Kampuchea's electricity supply systems were outdated and unable to meet the demands on them. Since then there has been wide-spread deterioration, particularly of the distribution systems. Fuel is imported, it is in short supply and, apart from Phnom Penh, power is available only for a few hours each day. There is an urgent need to repair or replace distribution systems.

For Phnom Penh there is much generating capacity remaining idle through lack of spare parts. Some of the unserviceable generators are "portable" and could be easily replaced. The demand is increasing. The oldest power station is at the end of its useful life. In addition to emergency repairs, a firm plan is needed to cope with the situation during the next five years.

Of all the sectors covered in this review, perhaps the one which is likely to pose most serious long-term problems is that of energy. The need for energy arises everywhere. The food-energy nexus has been much discussed in the literature, and is nowhere more important than in Kampuchea, where the need to pump water to provide irrigation makes demands on energy resources that are at present not available. Kampuchea's industrial future will also depend on the supply of cheap plentiful energy.

It is therefore strongly stressed that every effort should be made by the newly appointed government and donors alike to develop energy sources, either by an accelerated programme of exploration for hydrocarbon reserves, or by the exploitation of hydro-power, or both.

C. TRANSPORT AND COMMUNICATIONS

1. Introduction

a. Geography

Kampuchea is a relatively small and compact territory within the Indochinese peninsula. It covers an area of some 181,000 km² and is bordered by Thailand to the west, by Laos to the north, by Viet Nam to the east, and the gulf of Siam to the south. Much of the country consists of a shallow lacustrine basin, centred on the Tonle Sap (Great Lake), which was formerly much more extensive than it is today. The land drains eastward via the Tonle Sap river, to the Mekong, which flows north to south through the eastern part of the lowlands before swinging eastward into Viet Nam and so to the sea. Kampuchea's population, economic activities and hence transport requirements are concentrated in the central lowland. The plateau and mountainous regions in the north, northeast and southwest are sparsely populated.

b. Infrastructure in the late 1960s

Kampuchea has an extensive network of navigable rivers. Until the opening of Kompong Som Port (then Sihanoukville Port) on the Gulf of Siam in 1960, it relied exclusively on Mekong river transport of its ocean traffic. The central lowlands were also served by a fairly well developed system of arterial roads and by two rail lines which linked the rice growing area of Battambang with Phnom Penh and with Kompong Som Port. (See: Chart IV.C.I)

The main transport and communications infrastructure in the late 1960s comprised:

(1) a deep water sea port at Kompong Som serving 12,000 DWT ocean vessels;

(2) some 1,240 km of navigable waterways (of which 580 km was navigable all year), with a river port at Phnom Penh accommodating 2,500 DWT ships and many other smaller river and coastal ports;

(3) some 4,200 km of national highways and 1,700 km of provincial highways;

(4) two major airports at Phnom Penh and Siem Reap and 28 small airfields at principal cities;

(5) two railway lines totalling some 650 km serving Phnom Penh/Battambang/Serei Sophon (390 km) and Phnom Penh/Kompong Som (260 km); and

(6) some 120 interurban telephone circuits radiating from Phnom Penh, serving 6,000 local automatic subscribers.

c. Infrastructure in the 1970s

The transport infrastructure was seriously damaged during the hostilities of the early 1970s. Further deterioration occurred, largely through neglect of routine and periodic maintenance during the period of Khmer Rouge rule in the late 1970s. Since 1979, rehabilitation has been hampered by lack of finance equipment, materials and labour, as well as a shortages by skills. Under these conditions, improvement or extension of the system has not been possible.

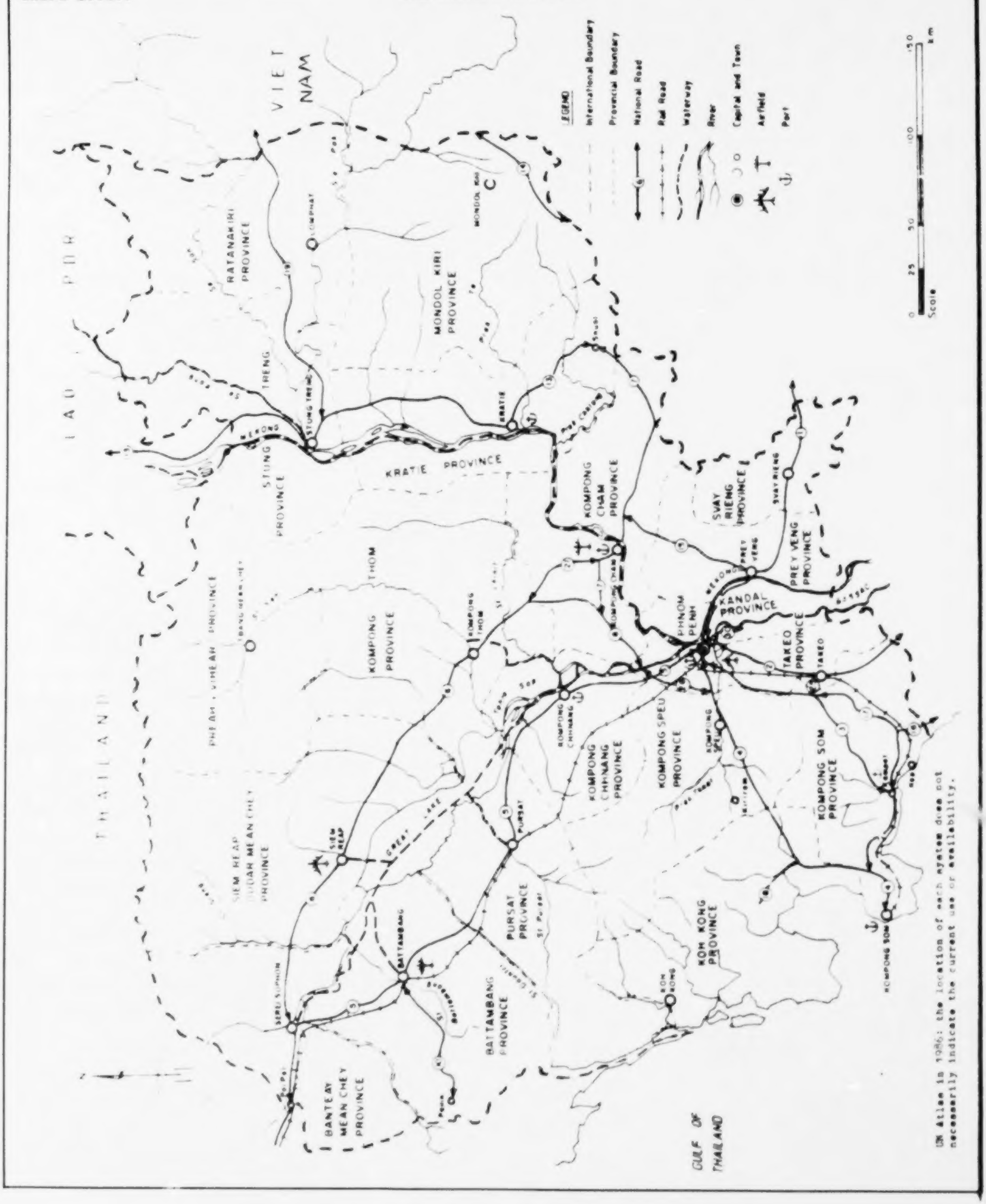
d. The 1980s

Responsibility for the transport and communications infrastructure and transport services is shared by the Ministry of Transport, Communications, and Posts, provincial and district authorities, and some autonomous self-financed government enterprises. The Ministry is responsible for development and maintenance of roads and bridges, railways, Phnom Penh Port and Kompong Som Port, and regulates road and river passenger and freight transport as well as postal services and telecommunications.

It consists of the Departments of (1) Finance; (2) Technical Affairs; (3) Organisation; (4) River Transport; (5) Posts and Communications; (6) Materials and Equipment; (7) Phnom Penh Port; (8) Kompong Som Port; (9) Roads and Bridges; (10) Railways; (11) Passenger Transport; (12) Truck Transport; and (13) KAMSAB Shipping Company.

According to some reports, the inter-departmental structure and line of command between such departments and out-of-ministry corporations or departmental companies are not clear. The Ministry currently has some 12,000

Chart IV.C.i **THE TRANSPORT SYSTEM**


LAO P.D.R.
VIET NAM
THAILAND
GULF OF THAILAND
RATANAKIRI PROVINCE
MONDOL KIRI PROVINCE
STUNG TRENG PROVINCE
KRATIE PROVINCE
PREAH VIHEAR PROVINCE
KOMPONG THOM PROVINCE
KOMPONG CHAM PROVINCE
SVAY RIENG PROVINCE
PREY VENG PROVINCE
KANDAL PROVINCE
PHNOM PENH
TAKEO PROVINCE
KOMPONG SPEU PROVINCE
KOMPONG CHHNANG PROVINCE
KOMPONG SOM PROVINCE
KOH KONG PROVINCE
PURSAT PROVINCE
SIEM REAP ODDAR MEAN CHEY PROVINCE
BATTAMBANG PROVINCE
BANTEAY MEAN CHEY PROVINCE
GREAT LAKE
MEKONG
LOMPHAT
MONDOL KIRI
KRATIE
STUNG TRENG
SVAY RIENG
PREY VENG
KOMPONG CHAM
KOMPONG THOM
KOMPONG CHHNANG
KOMPONG SPEU
TAKEO
KAMPOT
KOMPONG SOM
KOH KONG
PURSAT
SIEM REAP
BATTAMBANG
SISOPHON
POIPET
PAILIN
LEGEND
International Boundary
Provincial Boundary
National Road
Rail Road
Waterway
River
Capital and Town
Airfield
Port
0
25
50
100
150
km
Scale

UN Atlas in 1986; the location of each system does not necessarily indicate the current use or availability.

staff, not including personnel working for provincial-level departments. While the central Ministry provides policy direction and technical assistance, the provinces bear considerable responsibility for the operation and maintenance of transportation services, including road repair.

Ministry of Transport, Communications and Posts staff, 1989

Autonomous road and bridges divisions:	2,300
Autonomous truck transport division:	1,700
Kampuchean Railway Company:	2,500
Autonomous Phnom Penh port division:	700
Autonomous Kompong Som port division:	1,300
Inland Waterway Transport division:	400
Dep't of Post Office and Telecommunications:	700
KAMSAB (Kampuchean Shipping Corp.):	200
Other Ministry Personnel:	2,200
TOTAL	12,000

The Ministry operates the Teck Thia Technical Training School. Students receive up to four years training in transport, construction, and mechanics, with future plans for a navigation training course. The school graduated its first class of 150 students in 1988, with another 200 students graduating in 1989. The school has no permanent teaching staff; Ministry personnel serve as instructors on a part-time basis in addition to their other duties. The school lacks technical documentation and manuals, teaching materials, laboratory equipment, etc. It is understood that the Ministry would like to give increased attention to technical training, particularly in the field of mechanics and heavy equipment operation, due to the high cost of such equipment and the importance of regular, ongoing maintenance.

It is understood that in 1969 there were more than 36,000 cars, trucks, and buses in the country. Much of Kampuchea's motor vehicle fleet was subsequently destroyed during the late 1970s. By 1979 the country was littered with vehicles reduced to twisted piles of metal. Much of this scrap metal has since been collected and recycled, or is being exported as scrap iron. During the "emergency" period which followed in 1979-80, many trucks and other vehicles were imported to facilitate transport of emergency supplies and material. Despite extensive use over bad road conditions, many of these vehicles remain in service. They have been supplemented by a number of Russian-made trucks. The Ministry's Road Transport Company currently operates some 700 transport trucks.

The Ministry's "fleet" is repaired in two truck repair workshops: one servicing Russian-built trucks; the other, built and supported by the Japan International Volunteer Centre (JVC), for the repair of Japanese-manufactured vehicles. The poor condition of the country's road network reduces the lifespan of motor vehicles, and generally makes road transport more difficult and less efficient.

Beginning in mid-1988, there has been a dramatic increase in the number of private vehicles in the country. Whereas since 1979 the few private cars were old or rehabilitated vehicles ("Phnom Penh Specials"), significant numbers of both new and used vehicles began to be imported in 1988 from Singapore and Thailand. The current motor vehicle fleet is as follows:

Cars	4,000
Trucks and Vans (4,200 in service)	5,500
Buses	1,600
Motorcycles/Scooters	29,500
Tri-cars/Motor-bicycles	13,700
TOTAL	54,300

All petrol and diesel fuel is imported by the State from the Soviet Union. In June 1989, fuel for private vehicles cost 30-37 riel per litre for petrol and 20-25 riel per litre for diesel oil or mazout, a highly subsidised rate compared to international prices. The petroleum refinery at Kompong Som, built in 1967-68 by the French company Koppers France, has not yet been rehabilitated. In the future, Kampuchea will require larger amounts of petroleum products, given the increase in motor vehicles as well the country's growing requirement for diesel-generated electricity.

Passenger and freight transport by both road and water currently are part of the State machinery. However, a recent proposal adopted by a Party Cadre' Congress recommends the establishment of privately-owned passenger and freight transportation services on a competitive basis. Under the proposal,the State would retain responsibility for transport regulations and general policy and administration of transportation services, including collection of tax and maintenance of roads, bridges, etc. The State would also be responsible for technical and safety inspection of vehicles, route licensing, and establishment of maximum fares or tariffs. Private enterprises would be allowed to import vehicles as well as fuel tyres, and spare parts should the State be unable to supply such goods. If the proposal is adopted, it would introduce competition into the transport sector and would probably result in an increase in the total number of motor vehicles.

e. The sector's needs

The kind of needs in the sector which may be required are summarised as follows:

- Study to determine reconstruction programme: To produce basic infrastructure inventory, review physical and organisational reconstruction capabilities, and recommend an optimal reconstruction and development programme;

- Strengthening the planning and management capability of Ministry of Transport, Communications and Posts: To provide experts in planning, policy-making and management for: Planning, Finance, Water Transport, Posts and Telecommunications, Phnom Penh Port, Kompong Som Port, Shipping Company, Roads and Bridges, Railways and Transport Departments;

- Review the possibility of providing, on a very urgent basis, motorised barges and other vessels to improve inland transport.

Table IV.C.1

TYPES OF ROADS, 1988

Surface Type	National	Provincial	Others	Total
Asphaltic paved road (largely deteriorated)	2,400	100	-	2,500
Gravel or lateritic paved or earth road	600	3,000	-	3,600
Total	3,000	3,100	1,100	6,100

2. Highways

a. Introduction

Kampuchea's primary road inventory presently consists of about 3,000 km of national highways, 3,100 km of provincial highways and 1,100 km of other roads. (See Chart IV.A.I and Tables IV.C.1-2)

The major road arteries radiate clockwise from Phnom Penh and connect almost all principal centres of economic activity i.e.:

- National Route RN1: Phnom Penh - Svay Rieng - Viet Nam border;
- RN2: Phnom Penh - Cambak - Takeo - Viet Nam Border;
- RN3: Phnom Penh - Kompot - Veal Renh -P. Ream;
- RN4: Phnom Penh - Kompong Speu - Kompong Som;
- RN5: Phnom Penh - Kompong Chhnang - Pursat - Battambang - Serei Sophon - Poipet - Thai border;
- RN6 (Junction with RN5): Skun - Kompong Thom - Siem Reap (Angkor Wat) - Serei Sophon;
- RN7: Skun - Kompong Cham - Viet Nam border - Snoul; and
- RN13: Snoul - Kratie - Stung Treng - Lao border.

These eight routes are the country's most important roads. Totalling some 2,000 km (Table IV.C.2), they were once almost completely paved with asphaltic materials. At present, some 1,100 km of road have strengthened or repaired pavement. The remaining 900 km need to be rehabilitated.

b. Road structures

Most of the primary road network dates back 5 or 6 decades and was built to serve light axle vehicles. Although some roads were progressively improved in the late 1960s and a few new roads were constructed to modern standards, most of the network remains unsuited to large amounts of traffic or heavier vehicles. In particular, pavements and shoulders are narrow, pavements typically ranging from 4

Table IV.C.2

INVENTORY OF NATIONAL HIGHWAYS, 1968

RN No.	Location	Length (km)	No.of lanes	Width (m)	Type	Surface Condition	Remarks
1	Phnom Penh-Kompong Trabek-Svay Rieng-Viet Nam border	167	2	5-6	Asphalt	Good	Under construction at Phnom Penh over Basak River; Ferry over Mekong River
2	Phnom Penh-Junction with Provincial Route 38	20	2	-	Asphalt	-	-
	Junction with PR 38-Chambak	25	2	-	Asphalt	-	-
	Chambak-RN 25	29	2	-	Asphalt	-	-
	RN 25-Takeo-Viet Nam border	61	2	-	Asphalt	-	-
3	Phnom Penh-Ang Tasom-Kampot-Veal Renh (Jnctn with RN 4)	202	2	5.5-6	Asphalt	-	22 narrow metal bridges; maximum safe speed 60 kph
	Veal Renh-Ang-Phsar Ream	40	2	-	Asphalt	-	Coincide with RN 4
4	Sihanoukville-Phnom Penh	226	2(4)	7	Asphalt	Good	
5	Thailand border (Poipet)-Sisophon (Serei Sophon)	47	2	4-5	Asphalt	Fair	
	Sisophon-Battambang	69	2	4-5	Asphalt (pt laterite)	Fair	5 narrow concrete, 4 narrow steel bridges; speed limit 30 kph; floods in rainy season.
	Battambang-Muong Russel-Pursat-Kompong Chhang-Phnom Penh	291	2	5-6	Asphalt	Fair	5 narrow concrete, 13 narrow steel bridges; section subject to flooding
6	Junction RN 5 (Prekdam)-Skun-Prakham-Kompong Thom	135	2	5-6.5	Asphalt	Good	26 steel bridges.
	Kompong Thom-Stoung-Siemreap	146	2	-	Asphalt	-	21 bridges, 6 narrow concrete.
	Siemreap-Sisophon (Jnctn RN 5)	104	2	5-6	Asphalt	-	27 narrow wooden bridges; 4 km one-way; 5 km subject to flooding.
7	Skun-Kompong Cham	44	2	5-6.5	Asphalt	Good	10 km narrow.
	Kompong Cham-Kandoal Chrum	43	2	4-5.5	Asphalt	Good	-
	Kandoal Chrum-Khy Krek-Dar	36	2	-	Asphalt	-	-
	Dar-Memot	11	2	-	Asphalt	-	-
	Memot-Snuol (Jnctn with RN 13)	46	1	-	Asphalt	-	-
10	Battambang-Snoeng-Pailin	83	2	5	Asphalt	-	Track and loose surface, dry weather.
12	Kompong Thom (Jn w/RN 6)-Sre	33	2	4-5	Laterite	Fair	-
	Sre-Chhep Kandal-Kompong Sralau (Laos border)	181	1	3-4	Gravel	Poor	Track and loose surface, dry weather.

Table IV.C.2 (cont'd)

RN No.	Location	Length (km)	No.of lanes	Width (m)	Type	Surface Condition	Remarks
13	Viet Nam border-Snuol-Kratie	101	1	-	Asphalt	Good	-
	Kratie-Stung Treng	114	2	5	Asphalt	-	-
	Stung Treng-Laos border	84	2	-	Asphalt	-	-
14	Viet Nam border-O Rang-Dak Dam (Viet Nam border)	103	-	-	Gravel	-	Loose surface, dry weather road.
15	Chup (Jnctn RN 7)-Prey Veng-Prek Khsay (Junction RN 1)	90	2	4-5	Asphalt	Fair	-
16	Jn RN 3-Kompong Trach-Kampot	91	2	5-6	Asphalt	Good	-
17	Kompong Trach-Viet Nam border	16	2	4-5	Asphalt	Fair	-
18	Kaaong (Junction RN 4)-Chikha	24	2	4-5	13 km crushed rock, 11 km laterite		-
19	Junction RN 13-Bung Lung-Viet Nam border	198	1	3-4.5	Laterite	-	-
21	Junction RN 6 (Kompong Thmar)-Bos Chek Prey-Jnctn RN 7 (Traeung)	56	2	4-5	Asphalt and laterite	-	-
25	Takeo (Junction RN 2)-Ang Tasom (Junction RN 3)	10	2	6	Asphalt	Good	-
26	Oudong (Jnctn RN 5)-Srang	61	2	4-6	29 km asphalt, 32 km laterite		-
30	Phnom Penh (Jn RN 2)-Prek Koy	25	1	-	Asphalt	-	-
	Total:	3,013km					

Source: United Nations, Atlas of Physical, Economic and Social Resources, September 1968

Chart IV.C.ii

EXISTING ROAD CONDITIONS AND REQUIRED IMPROVEMENTS OF PRIMARY NATIONAL HIGHWAYS IN 1989

1. Phnom Renh-Svay Rieng-Viet Nam Border (167 km)

2 lanes, 5 to 6 m wide once asphaltic paved 120 km temporary repair made, 18 bridges temporary repair. Ferry over Mekong (NGO/OXFAM: Ferry rehabilitation and ferry repair workshop), 3 span concrete bridge constructed by Kampuchea-Viet Nam joint work brigade over Prek Kaom, well maintained. Widening entire section 6 m to 10 m (roadway) required.

2. Phnom Penh-Cambak-(RN25)- Takeo-Viet Nam Border (135 km)

2 lanes, once asphaltic paved, Section (P. Penh-Bat Rokar) fair temporary repair made, driving speed 60 km/hr possible, Section (Bat Rokar-Takeo) poor with driving speed only 20 km/hr. Rehabilitation of some 20 km in the Section Bat Rokar-Takeo required.

3. Phnom Penh-Kampot-Veal Renh-(P. Ream) (242 km) (202)

Section (P. Penh-Kampot) 202 km, 2 lanes, 5.5 to 6 m wide once asphaltic paved, 159 km temporary repair made. Beyond the section no information, 22 narrow metal bridges involved in entire section. (1) Strengthening some 40 km of the Section (P. Penh-Kampot); (2) Widening entire section P. Penh-Kampot 202 km to 6 m to 10 m (roadway).

4. Phnom Penh-Kompong Som (226 km)

2 lanes 7 m wide (carriageway), once asphaltic paved, called "American Highway", well maintained on almost all section, re-surfaced recently, all bridges repaired temporarily, existing traffic volume: 500 trucks/day. Widening entire section 6 m to 10 m (roadway) required.

5. Thailand Border (Poipet)-Serei Sophon-Battambang-Phnom Penh (407 km)

2 lanes, 4 to 5 m wide, once asphaltic paved. According to the Mekong Atlas 1988, "speed limits were 30 km/hr, floods in rainy season in Section Sisophon-Battambang" of total length, 150 km newly rehabilitated. 5 narrow concrete and 4 narrow metal bridges are involved in Section Serei Sophon-Battambang and 5 narrow concrete and 13 narrow metal bridges in Battambang-P. Penh (total: 27 bridges). Proposed repair works cover 50 km (Km 50 east of Battambang to Battambang), 20 km (Km 20 east of Pursat to Pursat) and 90 km (Pursat to P. Penh). (1) Reconstruction of some 50 km in the Section Thai Border/Project to Serei Sophon; (2) Rehabilitation of some 85 km in the Section Battambang to Pursat; (3) Strengthening of some 90 km (50%) in P. Penh to Pursat required.

6. Junction RN5-Skun-Kompong Thom-Siem Reap-Serei (385 km)

2 lanes 5 to 6.5 m wide, whole section once asphaltic paved 21 concrete, 6 narrow metal and 27 narrow wooden bridges involved of total length, 100 km resurfaced, 42 bridges repaired except for one big bridge over Stung Chikreng, now fordable only in dry season. Some 40 km beyond Skun to K. Thom utterly destroyed. Due to this, it takes 24 hrs or more to drive from P. Penh to K. Thom some 130 km to pavement K. Thom-Siem Reap destroyed. (1) Rehabilitation of some 85 km in Section Kompong Thom-Sisophon; (2) Reconstruction of some 40 km in Section Skun-Baray; (3) Rehabilitation of bridge over Chikreng required.

7. Skun-Kompong Cham-Snoul Snoul (180 km)

2 lanes except for section Memot-Snoul (one lane) whole section once asphaltic paved, of which 40 km of section Skun toward K. Cham resurfaced remaining part lateritic paved. Rubber plantations at eastern end (priority given to transport of raw rubber. Rehabilitation of some 120 km in Section Km 40 west of Skun to Snoul plus 30 km beyond Snoul toward Viet Nam border required.

13. Viet Nam border-Kratie-Kratie-Stung Treng-Lao border (299 km)

2 lanes except for section Viet Nam Border-5 m wide, whole section once asphaltic paved, of which some 280 km of pavement destroyed, 25 bridges recently temporarily repaired including 4 big bridges replaced by bailey type of facilities (L = 60 m, 80 m, 132 m, 148 m). Rehabilitation of some 280 km in whole Section required.

Source: Department of Road and Bridges, and NGO staff in Kampuchea, June 1989.

to 6 m. An exception is the 7 m paved carriageway of RN4, Phnom Penh–Kompong Som, the so-called "American Highway" which was built in the 1960s. Moreover, relatively low embankments built from insufficiently compacted sand and clay materials, and with inadequate drainage facilities, make the roads liable to floods during the annual monsoon. This causes serious damage to pavements and embankments. Most bridges are single-lane wooden or steel (I-beam and Bailey bridge) temporary structures with severe load restrictions.

c. Traffic volumes

Table IV.C.3

STAFFING TABLES, DEPT. OF ROADS AND BRIDGES, 1980 AND 1988

Description		Number of Personnel	
		1980	1988
Offices:			
1	Head office	4	4
2	Administration office	21	44
3	Personnel office	8	18
4	Supply office	12	16
5	Planning office	6	10
6	Technical office	28	14
7	Accounting office	7	11
	Office total:	275	117
Divisions:			
8	Rock quarry div.	192	195
9	Machine repair div.	100	165
10	Saw mills div.	30	87
11	Bridge construction div.	136	332
12	Road construction div.	36	277
13	Neak Loeung Ferry div.	63	85
14	Tonle Bet Ferry div.	63	60
15	Prek Kdam Ferry div.	63	65
16	Concrete production div.	42	96
	Autonomous financed div. total:	725	1,362
Units:			
17	Training school unit	-	20
18	Logistics and material unit	-	44
19	Building construction unit	18	134
20	Route 521 common repair unit	-	62
21	Route 4 repair unit	-	53
22	Route 6 repair unit	-	71
23	Route 223 repair unit	-	89
24	Route 13 repair unit	-	19
25	Route 5 independent repair unit	-	80
26	Route 1 independent repair unit	-	72
27	Topography unit	-	72
	(Not yet self-financing) Unit total:	18	716
	Total	1,039	2,195

According to the 1970 World Bank Report, 1970, traffic counts on major national highways from 1964 to 1968 showed relatively high volumes, typically ranging from 500 to 2,500 vehicles per day with roughly even distribution between motorcycles, light and heavy vehicles. Highest recorded volumes were some 3,100 on RN4, Phnom Penh–Kompong Som (then Sihanoukville). Recent estimates show about 500 trucks per day on RN5.

d. National highways before 1979

Formal development of the Kampuchean road network began in 1890. By 1969, total length of all roads including trails was 34,000 km. Along the National Routes described above there were some 4,100 bridges, of which 1,000 were concrete, 1,200 steel and 1,900 wood. The two largest bridges in the system were the Chroi Chang Vau across the Tonle Sap river and the Chbar Ampeou across the Bassac. There were 10 ferries of which the important ones were Neak Loeung, Prek Kdam and Tonle Bet.

During the decade 1969–79, the road system deteriorated severely. The civil war of the early 1970s not only prevented road and bridge maintenance but saw the destruction of the Chroi Chang Vau bridge by bombing. After 1975, many other bridges were destroyed. The streams and rivers were crossed either by earth-fill dams that had been built across them or by boat. Radical changes in land use patterns meant that stretches of some national highways were frequently and extensively flooded, causing very rapid deterioration. The situation was so severe that by 1979, some portions of National Routes 5, 6 and 13 could no longer be recognised as roads. In addition, some 70–80 percent of bridges, culverts and other minor structures were either severely damaged or completely destroyed so that traffic flow was slow or completely blocked. Institutionally, many highway engineers and technicians of all types were either killed or forced to flee. Highway construction and maintenance equipment and materials were either allowed to deteriorate or removed.

e. Highway system rehabilitation 1979-89

In April 1979, a Department of Roads and Bridges was formed within the Ministry of Transport, Communications and Posts to undertake the massive and urgent task of national highway reconstruction. As a first step, it brought together as many surviving highways engineers and technicians as possible, together with whatever equipment and materials could be found. The numbers of trained personnel and the available resources, however, were so small that the Department had to rely on assistance from the USSR, Viet Nam and international humanitarian organisations. The United Nations itself provided vital assistance during this period under its emergency assistance programme. Help was given to re-establish the transport department of government, and to initiate the rehabilitation of the road system by financing the provision of emergency highway repair equipment and materials. Since 1980, the Department has concentrated on technical training for its staff, both within the country and abroad for short and long periods. Partly because of the human resources aspects, the Department modified its organisation structure twice, in 1980 and in 1984. Table IV.C.3 shows the number of people assigned to the Department's various offices, divisions and units in 1980 and 1988.

Table IV.C.4

EQUIPMENT OF DEPT. OF ROADS & BRIDGES, 1989

Item	Number	Remarks
Vehicles		
Dump trucks	191	out of service 19
Water tankers	39	" " " 2
Flatbeds	61	" " " 3
Mobile cranes	18	
Trailers	7	
Asphalt tankers	3	
Asphalt spraying trucks	2	
Personnel transport trucks	31	" " " 1
Mobile workshop trucks	4	" " " 2
Cars	47	
Crane	1	
Total Vehicles	404	out of service 27
Mechanical equipment		
Bulldozers	63	out of service 5
Graders	12	" " " 1
Front-end loaders	9	
Excavators	28	
Farm tractors	12	
Scrapers	10	
Rollers	44	" " " 2
Rock crushers	12	
B.T.S. machine	2	
Well-Drills	2	
Ferry boats of all types	13	
Barges	2	
Tampers	6	
Concrete mixers	5	
Concrete asphalt boilers	2	
Asphalt paving machine	4	
Mechanical saws	8	
Total Mechanical Equipment	234	broken 8

As can be seen from that table, Department staff have more than doubled since 1980. The Department now consists of nine offices, nine autonomous self-financing divisions, and 11 "not yet self-supporting" units. It is responsible for the design, construction and maintenance of the national highway system. However, implementation depends to some extent on provincial authorities. Provincial and local governments are responsible for provincial and rural roads respectively.

f. Materials and equipment

Since 1980, materials supply, storage and distribution have been organised to ensure reliable supplies with the minimum of delay. The Department's vehicle and equipment fleets in 1989 were as in Table IV.C.4.

g. Bridge maintenance and construction

The stock of bridges throughout the country has suffered greatly due to outright destruction, neglect, and excessive loads. Since 1979, the Department has repaired and built the bridges set forth in Table IV.C.5.

Table IV.C.5

BRIDGE REPAIR AND CONSTRUCTION, 1979-88

Year	Bridges Repaired		Bridges Constructed	
	Number	Length (m)	Number	Length (m)
1979	11	226	16	746
1980	20	546	21	638
1981	34	1,433	14	435
1982	56	1,974	20	502
1983	17	457	12	672
1984	11	540	10	524
1985	14	496	12	388
1986	11	494	18	487
1987	22	480	20	324
1988	11	245	14	476
TOTAL	207	6,891	157	5,195

h. Road maintenance and construction

In an attempt to keep as much as possible of the national road network open, the Department has done the work outlined in Table IV.C.6 since 1979.

Details of work undertaken on the country's principal roads since 1979 are:

National Route 1. RN1's total length of 167 km had been completely destroyed prior to 1979. Because the Department lacked the capability to rebuild it, Vietnamese assistance was used to completely repair the road from Phnom Penh-Bavet during 1979-82. Ferry boats were also provided in the first year of work. In 1981, the Department commissioned two old ferry boats that it had repaired at the Neak Loeung and Tonle Bet ferries. The Vietnamese team widened the road from 4.5-5.0 m to 6.0 m excluding shoulders. After 1982, the road again deteriorated rapidly due to heavy traffic and the Department has been maintaining it since then. Four new concrete bridges have been built along the route. The first was built with Vietnamese assistance in 1985, the others by the Department in 1987 and 1988.

Table IV.C.6

ROAD MAINTENANCE AND CONSTRUCTION, 1979-88

Year	Asphalt paving (km)	Shoulder work (km)	Laterite paving (km)	Foundation work (km)
1979	122	6	-	-
1980	94	-	-	-
1981	58	70	18	-
1982	69	16	98	-
1984	124	-	71	-
1985	94	3	25	-
1986	57	2	15	-
1987	83	-	37	1
1988	48	-	80	6
TOTAL	749	97	344	7

National Route 2. This route was originally completely asphalt-paved, but by 1979 much of the pavement had been completely destroyed. In 1982, the provincial offices of Kandal and Takeo were given responsibility for repairing the road with Vietnamese and Soviet assistance. The Department's Route 3 repair unit was also able to help. At present, although only parts of the road have been re-asphalted, it has been widened from 4.5 m to 6.0 m.

National Route 3. Much of the 240 km of this road was badly deteriorated in 1979, except for 30 km north and south of Kampot. Since then, it has been completely repaired and 80 percent of it is asphalt-paved.

National Route 4. This 227-km long road is the most important in the country. It was the country's first modern road, its 7.0 m width being completely paved in asphaltic concrete. Although it is now deteriorating, requiring resurfacing with at least 5 m^3 of asphaltic concrete, it has been kept open at all times and bridge and roadway repair work are continuing. The road can now accept 30-tonne loads and traffic can travel at 60-80 km/hr.

National Route 5. 408 km long, this strategically important route to Battambang and the Thai border was completely destroyed by 1979. Some parts of it were rice fields, other ponds. A journey from Phnom Penh to Battambang required a night stopover somewhere along the route. Since 1979, much of the foundation work for a repaired road has been completed; it now takes only 9 hours to travel to Battambang. Work, which includes foundations, laterite embankment and asphalt paving is continuing as resources become available.

National Route 6. Also completely destroyed, repair work has been under way since 1982. Some sections are now complete, including new bridges. But even freshly repaired sections are beginning to subside due to heavy traffic loads. Much more still needs to be done.

National Route 7. Also completely destroyed. Repair work commenced in 1982 with Vietnamese assistance and much of the road is now usable. But bridges still need to be repaired.

Table IV.C.7 consolidates the amount of work achieved over the past 10 years.

I. The next 10 years

According to discussions with NGO staff in June 1989, it seems that the Department is about to establish a new longer term development plan for the road and bridge network. Severe resource and technical constraints still exist, of course, which will require substantial foreign assistance of all kinds, but within these constraints and in keeping with the transport demands of the country, the Department is reported to have identified the following priorities for the future:

Table IV.C.7

ACTIVITIES OF THE DEPARTMENT, 1979-88

Work	Result
Lay rock and asphalt	749 km
Road shoulder work	97 km
Road foundation	7 km
Lay laterite	344 km
Repair all kinds of bridges	6,891 m
Install " " "	5,195 m
Build new K-5 roads -routes 6932, 18, 56, 58B	274 km
Build all kinds of bridges	1,728.50 m
Ferry people at 3 ferries -Neak Loeung, Tonle Bet and Prek Kdam ferries	17,687,977 people
Ferry motorbikes	4,192,505 ea
Ferry vehicles and engines	782,275 ea
Drill well and set up pumps	402 wells
Repair Pochentong airfield	1st step finished
Build tank training roads at Long Ve	finished
Lay rock and asphalt pedestrian path at Long Vek	finished
Lay asphalt roads in front of Royal Palace	finished
Lay asphalt on Nat. Route 4 -Phnom Penh-Pochentong Airport	finished
Lay bricks on road shoulder in front of Palace	finished
Lay foundation and asphalt on Son Ngoc Minh Street	20%

(1) Continue to strengthen and develop the capabilities of the Department itself through technical and financial co-operation with friendly countries;

(2) Continue intensive reconstruction of the national highway network, particularly, in order of priority, RN4, 5, 6, 7, 1, 3 and 13;

(3) Continue to develop the Department's human resources in economic and technical areas, and particularly to increase the number of engineers and mid-level and supervisory technicians;

(4) Develop the Department's own equipment repair and maintenance capability in selected locations: particularly renovation and improvement of an engine repair shop in Phnom Penh; construction of three vehicle repair workshops in Phnom Penh, Battambang and Kompong Cham; equipping engine and vehicle maintenance workshops at various divisions and work sites; installation of rock crushers of 100,000 m^3 capability, one each at Kompong Chhang and Phnom Sampeou, Battambang; construction of a technical research institute in Phnom Penh; and installation of three asphalt factories at Phnom Penh, Battambang and Kompong Som;

(5) Improve ferry services. Six new ferry boats are needed: three 60-tonne boats for use at Prek Kdam (two) and Stung Treng (one), and three 20-tonne boats for use at Tonle Bet (two) and Neak Loeung (one); and

(6) Arrange for foreign assistance to reconstruct the Chroi Chang Vau bridge across the Tonle Sap.

j. The sector's needs

The Mission has reviewed the proposed programme, and has reached the conclusion that future priorities should be as follows:

(1) Study to establish a master plan for rehabilitation of national and provincial highways;

(2) Provision of road and bridge construction equipment, vehicles and materials:
- Construction equipment, vehicles and materials for the road and bridge construction companies;
- Optimal size of quarry equipment for the quarry company;
- Maintenance equipment, vehicles and materials for 4 road maintenance brigades;
- Training facilities including the services of two external training experts for 6 months for the training brigades;
- Repair and maintenance facilities for the heavy equipment workshops.

(3) Rehabilitation of Chroy Vau Bridge;

(4) Construction of 50 km of Poipet-Serei Sophon Section of National Highway RN5;

(5) Rehabilitation of 790 km of national highways:

Pavement strengthening (130 km)
- 40 km within Phnom Penh-Kampot section, RN3
- 90 km within Phnom Penh-Pursat section, RN5

Rehabilitation (600 km)
- 20 km within Bat Rakor-Takeo section, RN2
- 85 km within Pursat-Battambang section, RN5
- 85 km within Kompong Thom-Serei Sophon section, RN6
- 40 km within Junction of RN5-Skun section, RN6
- 40 km within Skun-Baray section, RN6
- 150 km within Skun-Viet Nam border section, RN7
- 280 km within Viet Nam border-Kratie-Laos border section, RN13

(6) Provision of ferry facilities.

3. Railways

a. Situation in the late 1960s

In 1967, the state-owned autonomous enterprise, the Royal Cambodian Railway, operated two lines totalling 647 km of metre-gauge single track. (Length of running track: 647 km, route mileage: 551 km, length of sidings: 97 km[1])

- One line ran from Phnom Penh (0 km)-Romeas (76 km)-Pursat (165 km)-Mong (223 km)-Battambang (273 km)-Serei Sophon (337 km)-Poipet (Thai border, 385 km). This was built in two sections (Phnom Penh to Battambang and then on to Poipet) between 1930 and 1940.

- The other line ran from Phnom Penh (0 km)-Takeo (75 km)-Kampot (116 km) and had been built in the early 1960s with assistance from France, Germany and China. It was extended 97 km to Kompong Som later on, the complete line opening in 1969.[2]

Table VI.C.8

RAILWAY FREIGHT TRAFFIC, 1965-1968

Year	Tons Carried ('000)	Agricultural Products: Tonnages ('000)	Agricultural Products: Percentage of total %	Freight Direction: Battambang to Phnom Penh ('000 ton)	Freight Direction: Phnom Penh to Battambang ('000 ton)
1965	388	292	77	326	54
1966	162	90	58	127	28
1967	278	191	73	238	24

Source: World Bank report, October 1970

The Phnom Penh to Poipet line was built with 30 kg/m rails with a maximum load per axle of 13 tonnes. The Phnom Penh to Kompong Som line was built with 45 kg/m rails, maximum load per axle, 20 tonnes.

The Phnom Penh-Poipet line linked up with the State Railways of Thailand line at Poipet: it was part of the former Indochina network and was to have been extended from

Phnom Penh to Ho Chi Minh City (then Saigon). Its main function, however, was to link Phnom Penh with the rich rice producing province of Battambang and no international traffic has moved over the line since October 1961. The Phnom Penh–Kompong Som line linked the capital with the port (then Sihanouk port) and nearby oil refinery. It provided an alternative to road transport for import-export commodities inclusive of oil. It also served the two provincial capitals of Takeo and Kampot.

Freight. From 1965-67, freight hauled by the railway fluctuated between 388,000 tonnes in 1965 and 162,000 tonnes in 1966 (Table IV.C.8). The wide variations were due to the railways' heavy reliance on agricultural commodities as the main source of freight. In general, agricultural products accounted for more than two-thirds of freight carried.

The balance of freight traffic consisted principally of manufactured commodities, construction materials and forestry products, but the railways were losing these items to road transport. One result of the system's reliance on agricultural freight was a lopsided distribution of traffic flows. Between 1965 and 1967, traffic moving from Battambang to Phnom Penh accounted for almost 80-90 percent of total freight traffic.

Passengers. Unlike freight traffic, passenger traffic grew steadily from 1.7 million passenger trips in 1965, to 2.4 million trips in 1968. Statistics for 1965-68 were:

Passenger Traffic

Year	('000 passengers)	(million pass/km)
1965	1,722	116.9
1966	1,655	108.1
1967	2,101	143.0
1968	2,415	173.0

Source: World Bank report, October 1970

b. The 1980s: reorganisation and rehabilitation

Organisation. The railways are currently operated by an autonomous state enterprise, the Kampuchea Railway Corporation (*Chemin de Fer du Kampuchea*, CFK), controlled by a 4-member Council of Administration. The present 648 route km of track is operated under the supervision of the Department of Railways.

The CFK has some 2,459 employees including engineers, technicians and workers, about the same as in 1968 (compared with only 1,600 three years earlier).

The Corporation consists of four divisions:

(1) Railways and Buildings. This division operates and maintains three lines (a) Phnom Penh to Kompong Som (263 km), (b) Phnom Penh to Serei Sophon (338 km), and (c) Serei Sophon to Poipet (47 km). It also maintains (d) 127 steel bridges totalling 2,053 metres and 506 concrete bridges of 5,468 metres total length, and maintains (e) terminal buildings and (f) workshops and administrative buildings (total 176 buildings).

(2) Locomotives and Wagons Division is responsible for the repair and maintenance of two 450 hp diesel engines, three 1,200 hp diesel engines and eight 700/1,250 hp steam engines.[3] Statistics for the number of engines and locomotives in 1989 and 1969 differ considerably. The inventory of locomotives and rolling stock in 1969 and 1989 were:

Item	1969 (a)	1989 (b)	 (c)
Locomotives			
Steam	24	4	
Diesel-electric	13	8	
Sub-total	37	12	(18)
Rolling stock			
Passenger coaches	81	21	
Freight cars	661	357	
Sub-total	742	378	(443)

Sources: (a) World Bank report, October 1970; (b) Ministry Report, June 1989; (c) Country Report No. 3, 1988, Indochina, Viet Nam, Laos, Cambodia, Business International

Of the total estimated rolling stock currently in service, there are about 20 passenger coaches, 300 box cars, 40 flat cars, 30 tank cars,and 60 cars of other types.

(3) Exploitation, Transport and Telecommunications Division controls telecommunications between five major stations including the central station at Phnom Penh, Pursat, Battambang, Kampot and Kompong Som, and other minor stations. It also manages a transport fleet of six 1-tonne trucks. And,

(4) General Services Division, which ensures the effective operation of five offices: i.e. (a) Planning, (b) Accounting, (c) Materials, (d) Personnel and (e) Administration. It also maintains a clinic for corporation staff.

Operations. According to the Ministry of Transport, Communications and Posts, the railway system was used occasionally during the Khmer Rouge period, but it deteriorated badly due to the hostilities in the late 1970s and lack of maintenance lasting for decades. In particular, almost 80 percent of some 550 bridges[4] in the system were destroyed or damaged. Temporary repairs using timbers, steel I-beams or Bailey type facilities have been made. Nearly half the roadbeds have been destroyed and need rebuilding although they have been in service using temporary repairs between Kompong Som-Phnom Penh and Phnom Penh as far as Serei Sophon. According to World Food Programme (WFP) observations, the railway track between Serei Sophon and Poipet has been almost entirely torn up. Large stretches are missing and even the roadbed is almost non-existent for much of the route.

On the other lines, three basic services run daily between Kompong Som and Phnom Penh, Phnom Penh and Battambang, and Battambang and Serei Sophon. The first two lines take a full day each, while the third service appears to take about three hours. On the Battambang-Serei Sophon stretch, at least two, flatbed cars are pushed in front of the engine in case mines have been laid by the Khmer Rouge. Passengers who ride in the passenger or freight cars pay 30-40 riels for this particular trip. Passengers willing to take the risk may ride at reduced rates on the two flat cars. The flat cars tend to be packed with people, suggesting that mines are not often triggered.

The system appears to have ample freight carrying capacity, idle freight cars having been seen which appear to be in usable shape.

Current expectations are that some 250,000 people will soon be returning to the north-west provinces. Returnees are likely to be processed through five different locations strung out along the railway line between Pursat and Serei Sophon.

The WFP is working towards the possibility of bringing rice in via Kompong Som, which can handle ships of 10,000 to 12,000 tonnes, as opposed to Phnom Penh, which is limited to ships of 1,000-2,000 tonne capacity. This suggests that provision of additional locomotives should receive special consideration.

Although it is thought that the railways possess enough people to operate and maintain the equipment they own, there are other physical constraints to future development. In summary, these include:

(1) Lack of locomotives: With more engines the Ministry could immediately increase the utilisation of the railroad. There are thought to be additional freight cars ready to use.

(2) Lack of passenger cars: At the moment, something like 800-1,000 people travel on each train.

(3) Lack of equipment to repair and maintain the roadbed: This would include bulldozers, stone crushers, graders, dump trucks, front loaders and welding equipment with a supporting generator. The Ministry has two repair shops in Phnom Penh to repair and maintain the rolling stock, and these are well equipped. Later on, the workshop in Battambang, which now has no equipment at all, and might be restored. The service stations in Kompong Som and Pursat could be improved.

(4) Lack of radiophone equipment: The present Soviet equipment is reportedly in poor repair. It should be replaced with 24 portable sets for

the immediate future or permanent equipment at a later date.

(5) Damage to the Serei Sophon–Poipet railroad: At one point, this was a "number one" priority. Discussions are under way with Thai business concerns, but presumably financing remains a problem.

In other developments, the Railway Transport Company, which in 1988 moved 200,000 tonnes of goods (43,000 tonne/km), as well as some 1,087,000 passengers (80,082,000 passenger/km), began negotiating in 1989 for the purchase of 50 wagons from an Indian company, CIMMCO International, in exchange for agricultural commodities. Delivery of the additional rolling stock is targeted for 1990.

It has been reported that the State Railways of Thailand (SRT) is seeking to make the Aranyaprathet–Poipet rail link operational by September. Before the Khmer Rouge takeover in Cambodia in 1975, Poipet had served as the main gateway into Cambodia, the entry point for all sorts of consumer products from Thailand. Although unofficial, private sector trade dealings have been flourishing along the Thai–Cambodian border and at Koh Kong in the recent past. Legitimate trading, however, is not expected to begin until after the Vietnamese withdrawal.

The SRT has also reportedly set aside five diesel locomotives to be used once the rail link between Aranyapratnet in Prachin Buri Province and Poipet in Cambodia's Serei Sophon District of Battambang Province is operational. Between 60 to 100 cargo container wagons have also been set aside for the purpose. There are also indications that the SRT has made preparations to repair rail tracks in Cambodia.

Apart from the tracks into Cambodia, the SRT has already made preparations to repair the Klong Loek bridge used to cross the border. It is reported that work had already started in Cambodia in March of this year to repair the 90 km-long railway from Battambang to Poipet along with a stretch of RN5 which runs parallel to the tract. About 5,000 workers from Thmar Puok, Sisophon, Mongkol Bourei and Battambang were mobilised to repair the road and the rail tracks.

c. The sector's needs

The kinds of development assistance which may be needed are summarised below:

(1) Provision of diesel locomotives: Supply of at least 6 locomotives, each with a horsepower rating of at least 1,000–1,200 hp, are required, two on each of the following lines: the Kompong Som–Phnom Penh line, the Phnom Penh–Serei Sophon line, and the Serei Sophon–Poipet line.

(2) Provision of railway equipment: Supply of the following equipment: Equipment to repair, maintain and rebuild the bridges and roadbeds, including optimal numbers of bulldozers, stone crushers, motor graders, dump trucks, front-end loaders and welding equipment with supporting generators; 24 sets of portable radiophone equipment to replace the present Soviet equipment which is reportedly in poor repair. Permanent equipment could be supplied at a later date.

4. Ports

a. Situation in the late 1960s

Kampuchea has two international maritime ports, a river port at Phnom Penh and a deep-water seaport at Kompong Som. In addition, there are a number of small riverine and coastal ports.

As noted in the 1970 World Bank report, Kampuchea relied exclusively upon Phnom Penh to handle all overseas trade up to 1960. When the port at Kompong Som was opened to shipping, the decision to build it was prompted by difficulties on the Vietnamese portion of the Mekong, then seriously hampered by the war. The site at Kompong Som (then Sihanoukville) had been chosen in 1956 for its deep water which permitted 10,000–12,000 dwt ships to berth. Although it began operations in 1960, it was not completed until 1965. Traffic at both ports between 1960–70 appears in Table IV.C.9.

Phnom Penh Port. From the table it can be seen that Phnom Penh's share of traffic declined considerably in favour of Kompong Som. The main reasons for this were, first, that Phnom Penh now handled only those cargoes whose origin or destination were in the Far East, namely traffic from Saigon, Singapore, Indonesia, Hong Kong and Japan. Second, traffic to or from socialist countries unfriendly with South Viet Nam was diverted to Kompong Som. Third, from the opening of the Kompong Som oil refinery in late 1968, Phnom Penh lost the oil import traffic. This had accounted for almost 50 percent of its total throughput in 1967 and 1968. Phnom Penh could nevertheless remain an important port, particularly for goods to and from the region, because of its proximity to major production and consumption centres.

At the end of the 1960s, the mooring facilities at Phnom Penh Port consisted of two reinforced concrete piers (total length 183 m) and four steel pontoons each 40 m long. In addition, 24 pontoons served inland water craft and barges. Water depths between the Mekong estuary and Phnom Penh varied between 5-7 m. Maximum vessel draft was restricted to 4.1 m in April and 5.1 m in September. The port could accept vessels of up to 4,000 dwt but in practice the average size was 2,000-2,500 dwt.

Administratively, the port was an autonomous state enterprise. It was directed by a Board whose chairman was the Minister of Public Works. This arrangement, which allowed the port to have its own budget, had been in force since 1964.

Table IV.C.9

Cargo & Ships Handled in Phnom Penh and Kompong Som, 1960-70

Year	Cargo (tonnes) Phnom Penh	Cargo (tonnes) Kompong Som	No. of Ships Phnom Penh	No. of Ships Kompong Som
1960	842,000	34,000	589	n.a.
1961	741,000	95,000	525	69
1962	898,000	168,000	625	125
1963	962,000	369,000	624	155
1964	707,000	714,000	490	250
1965	595,000	754,000	390	266
1966	517,000	548,000	335	258
1967	535,000	545,000	332	245
1968	453,000	747,000	279	325
1969	294,000	954,000	174	279
1970	140,000	736,000	93	180

Source: ECAFE, Inspection Report on the Transport Situation in the Khmer Republic, July 1971

Kompong Som Port. Kompong Som's natural advantages include deep water inshore and a degree of natural protection from storms provided by a string of islands across the mouth of the bay. In its first phase, the port was equipped with a 285 m pier which, 28 m wide, provided two berths per side. It also had two 120 x 54 m warehouses. As traffic soon exceeded initial expectations, a second phase began in 1964 comprising two more 350 m quays, a 500 m diameter turning basin, two warehouses and two breakwaters. The port was also to have acquired a dredger but, by 1970, this had not yet been delivered and siltation had reduced the available draft in the turning basin and at the new quays from 10 m to 6.5 m. However, if all of the port's facilities are efficiently operated, it should be able to handle some 1 million tonnes of cargo annually.

Kampot. Of the minor ports, Kampot was the most important coastal facility. It was a lighter port, with two main approaches from the sea, one of which (Kinh Ganh Dau) had fairway depths of 10 m to within 11 km of the port. The other, southern, channel could accommodate vessels of less than 4.6 m draft. There were then three channels through which junks and lighters could enter the river to reach Kampot. The quays lined the river banks and cargo was transferred to the junks by ship's gear and then manually from junk to shore.[5]

b. The current situation

As was the case with other infrastructure, the ports had suffered from neglect and actual damage during the 1970s; and, as part of its emergency relief programme in 1979-80, the United Nations provided major assistance to rehabilitate them. Considerable assistance was also provided by the Soviet Union at that time for this purpose as well.

The two major maritime ports are administered respectively by the Phnom Penh Port Department and the Kompong Som Port Department. These may be organised along the same lines as the previous autonomous port authorities. It is understood that the Phnom Penh Port Department has 744 employees, while the Kompong Som Department has 1,261 employees. A third maritime entity is the state-owned shipping company known as KAMSAB.

Commodities handled at Phnom Penh, Kompong Som and Kratie ports in 1989 totalled 277,500 tonnes, consisting of 199,000 tonnes imports, 54,000 tonnes exports and 24,400 domestic exchange. Maritime port services are said to be improving, despite fines paid to some Soviet companies. Hard currency earned at Kompong Som port in 1987 is put at 91,890 roubles, £72,898 and US$9,298. The relative importance of sterling reflects the level of trade with Singapore, much of it financed by international relief or humanitarian agencies.[6]

Commodities handled via Phnom Penh and Kompong Som in 1988 were reportedly 120,000 tonnes and 208,000 tonnes respectively, a little less than one-third the levels of cargo in 1968.

Phnom Penh Port is situated at the confluence of the Mekong River and Tonle Sap, 288 km from the mouth of the Mekong. According to the "Guide to Port Entry 1987-88", there are six bars between Vung Tau and the port; one at the entrance to the Cua Tieu, four in the river and one at the port entrance. The locations of these bars are constantly changing but safe drafts range from 4.39 to 5.49 metres according to the season.

Port facilities consist of a 183 m reinforced concrete pier, plus three pontoons for sea-going vessels. Some 540 m of domestic pontoon capacity is available for riverine ships and barges of up to 100 m or 1,800-2,000 tonnes. The pontoons are served by lighters and junks. There are other berths available for small craft. There are 12 depots of 2,700 sq m and 5,910 tonnes storage capacity within some 180 m of the berths, plus open storage of some 4,300 sq m.[7] There is another warehouse complex at Kilometre 6 (Phnom Penh) having 15 sheds with a total capacity of 70,000 tonnes and 8 sheds of nearly 4,000 tonnes.[8] Although actual crane capacity is not clear, there are 12 cranes: i.e. 2-25 tonne units, 4-16 tonne and 6-6.5 tonne cranes.[9]

The port serves up to 150 ships per year, including 3 Singapore-based cargo vessels which take 10-12 days for the return voyage. According to informal estimates by a Singaporean shipping company, the port may handle up to 180,000 tonnes of cargo a year, half of which may be carried on Singaporean vessels.

The port has also some fork lift trucks and trailer trucks. Main commercial imports via Singapore include machinery, foods, automobiles and spare parts. There are some sunken ships in the Tonle Sap close to the port.

The Japanese had shown interest in the development and transfer of Phnom Penh Port from its present location on the Tonle Sap to a new location on the Mekong based on a preliminary techno-economic study in 1965-66. The project, which was part of an urbanisation plan, would have permitted deeper draft ships to call at Phnom Penh. Four piers of 105 metres each, new warehouses and access roads were to be built as well as provision of handling and miscellaneous equipment. Rehabilitation of the Tonle Sap bridge will be required so that it connects the new port with Phnom Penh over the Tonle Sap.

Kompong Som Port is located in the bay of Kompong Som and provides facilities for 10,000 to 12,000 dwt ocean-going vessels. The depth at the bar in the south channel is 7.6 m and 7.2 m in north channel.

The port's main wharf is 550 m long, with a minimum depth along side of 9.4 m. Four 1,000 tonne vessels can be accommodated. But they are restricted to 7.6 m draft plus height of tide on the east side of the pier and 9.5 m draft on the west side. There are various other berths available for smaller vessels. Larger vessels can load and discharge at the north and south anchorages into lighters. Water depths are 9-11 m and 10-12 m respectively. The lighterage basin is situated near the inner end of the main wharf.

The port's tanker terminals are situated at *Pointe du Depart*, 9 km NNE of the commercial port. Mooring buoys provide two berths in 13 m of water, capable of accommodating tankers up to 220 m with a maximum draft 11.5 m.

According to the Ministry of Transport, Communications and Posts, Kompong Som has 14 shore cranes: two 11-tonne, eight 6.5-tonne, one 16-tonne, one 30-tonne, and two 40-tonne units. There are also five warehouses of 39,000 sq m total area to accommodate 73,000 tonnes of goods within some 290 m of the berths. Open storage consists of 57,000 sq m. The port has a shipyard capable of building and repairing 350 tonne wooden vessels. It is served by a rail connection to Phnom Penh and onward to Battambang and the Thai border.

Until late December 1988, only ships from socialist countries were regularly allowed to use Kompong Som, and during that year, the port handled 118 ships with a total of 207,800 tonnes of goods. However, during the first five months of 1989, some 40 percent of ships using the port were from Singapore, Hong Kong, and Japan.

After a political settlement, this port will need to unload large quantities of aid commodities. In the long run, the port will play a key role in handling the import of goods for reconstruction and development purposes so that special consideration should be given to restoring and improving the capacity of its existing facilities and equipment.

It seems that new wharfs are being built and access channels are being deepened. A general plan to extend the port existed in 1960s, including a second basin and two converging break waters. If that plan is followed, total wharfage of 3,800 yards would provide 20 berths for sea-going vessels inside the basin.[10]

c. The sector's needs

The kind of assistance which may be required in the sector can be summarised as follows:

(1) Study of maritime transport constraints and ports development master plan: Expert surveys and guidance on maritime legislation, port management and control, port tariff structures and pricing, port computerisation and containerisation;

(2) Provision of cargo handling equipment to meet immediate port needs: To provide Phnom Penh and Kompong Som ports with the optimal numbers of forklift trucks, tractor trailers, stevedoring pallets and ancillary items, or any other in-port cargo handling system, as determined by the study on physical constraints to cargo handling.

5. Inland Water Transport

a. General

Historically, inland water transport (IWT) has been the most reliable and conventional form of transport in Kampuchea. Although it was thought before the 1970s that road and rail transport might replace it, it is now clear that IWT will remain important. In some areas, particularly on the left bank of the Mekong and in the Tonle Sap area, it may even be the main mode for some time. Reliable data on IWT are particularly difficult to find, however, leading to unrealistic inter-modal comparisons. Although some data on the length and depth of navigable waterways and the size of the registered fleet before 1970 are available, substantial but so far unquantified damage was inflicted in the 1970s in terms of both outright destruction and neglect. The present situation is therefore very hard to define.

b. The navigation network

The most important waterways are the Mekong river, the Bassac tributary, the Tonle Sap river and the Great Lake itself. During the rainy season when almost the whole of the south-eastern part of the country is inundated, IWT is almost the only possible form of transport in this area. The total length of navigable waterways is about 1,750 km of which the Mekong accounts for about 30 percent. The Tonle Sap river accounts for another 15 percent, the Bassac 5 percent, and other rivers 50 percent. The inland waterways system is shown in Chart IV.C.iii. Interconnections are split into Elementary Route Units (ERU) as shown in Table IV.C.10.

As Chart IV.C.iii shows, some 580 km of main navigation route are navigable year-round. The main sections are ERU T1 in the Tonle Sap river, 201 km Phnom Penh-Kompong Chhnang; ERU S1 and S2 in the Mekong river, 108 km Phum Chihe-Kompong Cham-Kratie; ERU S4 in the

Table IV.C.10 NAVIGABILITY CHARACTERISTICS OF ELEMENTARY ROUTE UNITS (ERUs) AND ALTERNATIVE WATERWAYS

ERu		Alternative waterways	Width	Maximum depth	Obstacles /	Bridges locks, dams,	Period of navigability	Total length
t1	(1)	Tonle Sap	>150 m	2.80		Tonle Sap Bridge, central spans broken	All season	102 km
	(2)	Tonle Sap Kandal Tonle Sap	< 45 m	2.50				99 km
t2		Tonle Sap	>100 m	2.00-0.80 Dec.-May	Snoc Trou Pass (± 20 km long)		August-Oct.	53 km
t3		Tonle Sap Little Lake Great Lake	>100 m	2.00-0.80 Dec.-May	Snoc Trou Pass (18 km long)		August- Oct.	130 km
u		Stung Son	> 85 m	2.00-0.80 Dec.-May	Snoc Trou Pass (8.6 km long)		August-Oct.	47 km
s1		Tonle Mekong	>100 m	3.30	Sdau shelf (371 km)		All season	108 km
			>100 m	3.90	Rocakoy (402 km)			
s4			>120 m	2.10	Kien-Chrey Krom Pass			
			>300 m	2.30	Kien-Chrey Locu Pass			
			>200 m	2.90	Prek Sangker			
			>200 m	2.30	Krauch Chhmar			
				2.30	Tuol Svay		All season	114 km
			>200 m	3.30	Anlong Samley			
			>200 m	1.90	Phum Thmey			
			>200 m	1.80	Chhlong			
			<200 m	1.90	Thmar Roap			
s3		Tonle Mekong			Rapids and rocks (Navigable at high water)		Line of rafts	209 km
w1		Tonle Melong	180 m	3.60	Chrui-Ampil Pass		All season	96 km
w2			120 m	3.80	Banam Pass			
v		Bassac				Bassac Bridge clearance at maximum high water (5.60)	August-Nov.	87 km
y		Tonle Toch Stg. Prey Veng					All season except April-May	25 km
z		Stg. Prey Veng Tonle Toch				(Navigable at high water)	August-Nov.	125 km
x Chew 1 to to high Sea			50 m	8.30 At low tide			All season	(100 m)
zz2 Kbal PO		Takeo River	30 m	1.00			All season	34 km
zz2 zz1		Takeo River	15 m	1.00		(Navigable at high water)	August-Nov.	12 km

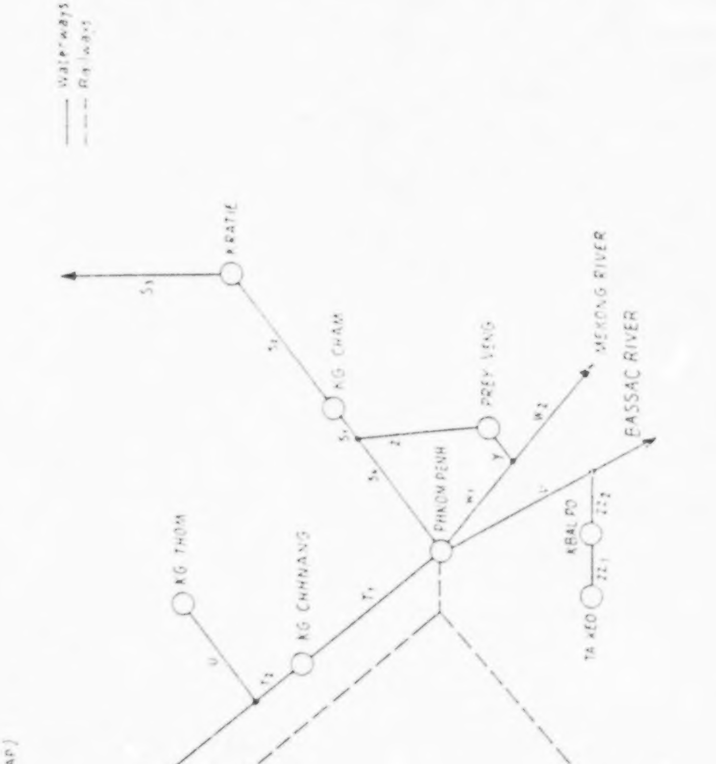
All season navigable: 578 km; Highwater season navigable: 663 km; Total: 1,241 km

Note: For t1, t2, t3, the width of the pass is given for the period of December to May;
for s1, s2, the width of the pass is given for the period of November to May.

Source: UN, ECAFE, Rehabilitation of the Inland Waterway Fleet in the RVV and the Khmer Republic, Annex III-23, May 1974

Chart IV.C.iii

INLAND WATER TRANSPORT SYSTEM



Waterways
Railways
KRATIE
KG CHAM
PREY VENG
MEKONG RIVER
BASSAC RIVER
PHNOM PENH
KBAL PO
TA KEO
KG THOM
KG CHHNANG
(TOP TONLE SAP)
BATTAMBANG
KG SOM
S1
S2
S3
S4
Z
Y
W1
W2
V
22.1
22.2
U
T1
T2
T3
X

Source: Rehabilitation of the inland waterway fleet in the RVN & the KR,UN ECAFE, Dec.,1974

Mekong river, 114 km Phnom Penh–Phum Chihe; ERUs W1 and W2 in the Mekong river, 96 km Phnom Penh–Viet Nam border; and ERU ZZ2 in the Takeo river, 25 km Kbal Po–Mekong river. ERU Y in the Toch river and Stung Prey Veng, 25 km Prey Veng–Mekong river is an important sector but is unnavigable during the dry season. Another 660 km are navigable by small motor launches between August and October/November when water depths vary from 0.8 m in May up to some 2.0 m in December. Mainly because of variable river depths and channels, ERU ETR V along 87 km of the Bassac has lost its importance and was used mainly by junks and barges to transport construction materials and wood.

c. Traffic flows

No reliable figures exist. In 1974, ECAFE was asked to develop a rehabilitation programme for the IWT system which had been damaged by war and neglect. The Mission was asked to consider the optimum intermodal transport patterns, including IWT, for the following commodities: rice/paddy, rubber, maize, tobacco, wood, fruits, fish, sugar, vegetables, construction materials, and minerals. Some of its findings were that most commodities from the eastern provinces could be transported by either water, rail or road; that rice from the north could be transported either via the Tonle Sap or by road; that oranges could be transported by barge to the nearest airport and then flown to Viet Nam; and that vegetables, fruit and fish could be brought by water from the Tonle Sap and other areas to the central market of Phnom Penh.

d. Transport fleet

According to the 1970 World Bank report, as well as the ECAFE study, the registered IWT fleet in Kampuchea in the early 1960s comprised some 820 motor launches, of which 600 carried only cargo and the remainder both freight and passengers. Although a few boats were licensed to carry up to 250 passengers or 120 tonnes of cargo, average capacity was relatively small. Many cargo launches were actually tugs for barges and junks. There were some 2,400 unpowered barges and junks of more than 16 tonnes capacity registered, including 6,300-tonne vessels. There were also 1,100 motor barges of some 10 tonnes capacity each that could carry either goods or passengers.

In 1973, the cargo transport fleet of vessels of more than 50 tonnes was:

Table IV.C.11

INLAND WATERWAY FLEET, 1973

Type of vessel	Fleet composition	
	Nos.	Capacity
A. Dumb barges		
Wooden hull		
51-150 tonnes	13	988
151-250 tonnes	5	1,328
over 250 tonnes	8	2,796
Subtotal	26	5,112
Steel hull		
51-150 tonnes	1	144
151-250 tonnes	5	8
over 250 tonnes	0	0
Subtotal	6	1,052
Total A	32	6,164
B. Motor barges		
Wooden hull	0	0
Steel hull	8	540
Subtotal	8	540
C. Tugs		
Steam	0	0
Motor	23	(3,400)
Subtotal	23	(3,400)
TOTAL A,B,C	63	6,704

Source: ECAFE, Rehabilitation of the Inland Waterway Fleet in the RVN and the Khmer Republic, May 1974.

d. Passenger traffic

The 1970 World Bank report noted that passenger traffic in 1968 was controlled through a route licensing system that was similar to that for buses. Some 60 scheduled services called daily at Phnom Penh, where some 700,000 passengers journeys either originated or ended during the year. There were regular services to Kompong Chhnan (100 km taking 8 hours) and Kratie (211 km taking 15 hours). On the basis of a registered capacity of 15,000 passengers and an estimated daily average run of 15-25 km at full load, annual passenger traffic amounted to some 80-140 million passenger/km. It was therefore comparable to the 173 million passenger/km recorded for the railways in the same year.

f. Deterioration during hostilities

The country's river transport system was seriously damaged during the 1970s. All types of river transport are reported to have deteriorated further since then, due to lack of maintenance and proper management.

Although there are no firm projections, there seems good reason to suppose that IWT will regain its importance in the near future. In the process, however, the following constraints should be recognised. First, mooring facilities at riverine ports are generally rudimentary and neglected to the point that they will constrain traffic flows and growth. Second, the organisational structure and capabilities of the Department of River Transport of the Ministry of Transport, Communications and Posts, which is responsible for IWT, may need upgrading to achieve the level of output required. The structure is thought to be much the same as in the 1970s. However, the Department possesses only the following fleet:

Type of vessel	No.	HP (each)	Capacity in tonnes
Tugboats	6	3,800	8,600
Barges	22		950
Cargo ships	9	3,866	1,580
Oilers	7	1,140	1,350
Passenger ships	2	500	400 places
Dredger	1		450 m^3/hr

Third, given heavy siltation of both the Mekong and Tonle Sap river during high water, ongoing dredging is required. The Water Transport Company operates an old Dutch-built dredger with a capacity of some 450 m^3 per hour or 400,000 m^3 per year. As the dredging season extends only from December to April/May, actual dredging capacity is limited to some 270,000 m^3, or less than a third the dredging requirement for optimal river shipping. In 1988, dredging activity focused in the Chakdomuk area near the Port of Phnom Penh, Banam near Neak Leung, and at Sdau at Kilometer 45 of the Mekong. The Department has allocated US$4 million to purchase additional dredging capacity, but has not yet chosen a supplier. With that capacity, the Tonle Sap channel will be dredged to allow larger boats (200-300 tonne) to travel between Phnom Penh and Siem Reap for up to six months a year.

Finally, the Water Transport Company operates a workshop on the Tonle Sap near Phnom Penh for boat and boat engine repair, but plans to construct a boat-building workshop are blocked by lack of funds.

g. The sector's needs

The kinds of development assistance which may be needed are as follows:

(1) The urgent provision of motorised vessels as an immediate means of improving internal communications.

(2) Hydrographic surveys and channel marking. This would involve:

- Re-establishment of missing ground control points of the existing vertical and horizontal-control networks on the Mekong mainstream from Kratie to the Viet Nam border and also on the Great Lake.

- Topographic mapping of the mainstream between Kratie and the Viet Nam border, and the Great Lake; and

- A new survey of the whole Mekong mainstream and its major tributaries and a first survey of the Great Lake, to collect hydrographic information fundamental to improvement of the national network of navigable inland waters and to facilitate
(a) Revision of the existing navigation charts,
(b) Identification of difficult stretches of the river where aids to navigation need to be placed, and the placing of these aid (channel marking),
(c) Study of the hydraulic regime of the river as a basis for planning river training works, and
(d) Channel marking - i.e. appropriate channel markers should be placed along the Mekong

between Kratie and the Viet Nam border and the Tonle Sap, to facilitate both day and night navigation.

(3) Dredging of navigable inland waterways (Preliminary stage):

- While routine dredging goes on, a study is required to determine the exact number, type and capacity of dredges needed for the proposed programme;
- Suitable dredges would then be ordered;
- Dredging would commence on shallow stretches of the Mekong upstream and downstream of Phnom Penh;
- Operations would be expanded to take in the entire navigable part of the Mekong, including the Tonle Sap River and part of the Great Lake.

6. Airfields and Civil Aviation

a. Situation in the late 1960s

At that time, Kampuchea had as many as 30 airfields (Table IV.C.13). However, civil air transport was almost exclusively concentrated at the two major international airports of Phnom Penh (Pochentong) and Siem Reap (for Angkor). The remaining airfields were small and used only by the administration, military authorities and private enterprises. Air traffic at Phnom Penh had never been interrupted except for a few days following an attack. In contrast, international air traffic into Siem Reap airport was discontinued in mid-1970.

Table IV.C.12

PHNOM PENH AIRPORT - TRAFFIC STATISTICS

Year	Arrivals Planes	Arrivals Passengers	Arrivals Freight (tonne)	Departures Planes	Departures Passengers	Departures Freight (tonne)
1965	1,911	33,356	258	1,913	35,465	439
1966	2,161	48,137	433	2,164	49,545	639
1967	2,246	52,670	514	2,449	56,877	911
1968	2,223	61,726	404	2,223	65,316	588

Source: World Bank Report, October 1970

Distances between the main cities are actually too short and potential markets for air services too small to make domestic air transport an economic alternative to rail and road transport. However, because of security problems on most roads, regular domestic air services were developed after October 1970 to link Phnom Penh with such provincial cities as Battambang, Kompong Som, Kampot, Koh Kong, Pailin, Sam Raong and Siem Reap. Regular services between Phnom Penh and Kampong Thom, and Phnom Penh and Pursat were also planned. In practice, most traffic was international and foreign tourists accounted for most of the Phnom Penh – Siem Reap traffic.

Passenger traffic at Phnom Penh and Siem Reap airports increased rapidly; from 1965 to 1968, plane movements at Pochentong Airport in Phnom Penh grew by about 4 percent per year. Passengers increased by some 17 percent yearly as Table IV.C.12 shows.

At Siem Reap, passenger traffic increased from 28,200 in 1966 to 47,700 in 1968, a 70 percent increase in two years.[11] Siem Reap was opened to Boeing 707s in November 1969. Pochentong was the only international airport, but as about 50 percent of Pochentong's traffic continued by plane to Siem Reap, it became clear that Siem Reap's importance would increase in relation to Pochentong.

From the mid-1960s, therefore, the bulk of investment in airport facilities was directed at the development of Siem Reap with assistance from the Republic of China and France. Although the runway of 2,550 m long by 45 m wide was already adequate for 707s, the terminal building was too small and required considerable extension. Investment at Pochentong was used to lengthen the runway from 2,400 m to 3,000 m, and to extend the parking area. In other investments, Battambang received a radio beacon system in 1968, Kompong Som (then Sihanoukville airport) a traffic control tower, Stung Treng a new runway 1,250 m x 40 m and an air terminal building, and Kompong Cham a terminal building.

Table IV.C.13

STATUS OF AIRFIELDS IN 1968

No.	Identification	Runway Length	Runway Width (m)	Runway Surface (m)	Navigational Aids	Remarks
International Airfield						
1	Phnom Penh (Pochentong)	3,000	40	Concrete	Tower, radio beacon, air/ground comm.	International jet airports entry. A 2nd runway (1,000 m x 60 m) laterite is closed.
Major Airfields						
2	Siem Reap	2,550	45	Concrete	Tower, radio beacon	Runway extension was completed in 1967.
3	Battambang	1,200	45	Asphalt	Tower (see Remarks)	Radio beacon to be installed in 1968; construction work in progress.
4	Labansiek	1,100	30	Laterite	0	In town.
5	Kompong Cham	1,200	40	Asphalt	0	Parking at sides of runway.
6	Kompong Chhnang	1,650	66	Laterite	0	General field parking; available to military.
7	Koh Nhek	1,200	30	ND	0	Runway recently completed.
8	Krakor	1,200	53	Laterite	0	General field parking.
9	Lomphat	1,100	40	Graded earth	0	--
10	Senmonorom	1,270	30	Graded earth	0	Old runway at SE end of act. runway.
11	Odong	1,760	46	Laterite	0	--
12	Pong Toek	1,440	41	Laterite	0	General parking SE of runway; approach obstruction 250 m hill 5 km to W.
13	Samrong	1,140	40	Graded earth	0	General field parking, runway fair.
14	Stung Treng	850	38	Laterite		Extn to 1,460 m in progress; completion date unknown.
15	Thbeng Meanchey	1,200	40	Laterite	0	
16	Camp le Rolland	1,100	20	Graded earth	0	A new runway under construction.
Airfields suitable for heavier than liaison air aircraft						
17	Champar Andong	1,030	30	Graded earth	0	Pvte rubber plantation: trees SE of runway.
18	Chamcar Leu	1,750	30	Graded earth	0	Parking N or S of runway.
19	Cheom Khsan 2	1,000	25	Graded earth	0	Runway condition fair/good.
20	Chup	1,450	50	Laterite	0	--
21	Kampot	800	60	Laterite	0	Gen. field parking, 170 hill, 1.5 km to west.
22	Kaemarak Phouminville	910	40	Graded earth	0	General parking NW of runway.
23	Kratie	1,100	50	Laterite		--
24	Krek	1,070	60	Laterite	0	Gen. parking W of runway; 25 m trees at end NNE.
25	Memot	1,100	40	Laterite	0	Available for civil use.
26	Ream Kompong Som (then Ream	1,200	30	Asphalt	Tower, radio estimated beacon	New runway, other construction in progress.
27	Prek Kak	1,200	60	Graded earth	0	Field may be used with a permission.
28	Tadak Pong	1,200	40	Grass	0	--
29	Virachel	950	30	Grass	0	Runway can be extended 30 m by removal of shrubs and grass.
30	Snoul	1,100	20	Laterite	0	--

Source: United Nations, Atlas of Physical, Economic and Social Resources, September 1968.

At that time, air transport was operated by Royal Air Cambodge, which was established in 1956 with 60 percent Kampuchean and 40 percent French participation. It was an autonomous state-owned company.

b. Deterioration during the 1970s

The country's air transport system was seriously damaged during the 1970s and airfields and aircraft both deteriorated further due to lack of maintenance and management. However, it seems that a number of small air transport firms were in operation in the early 1970s, whose services were used to convey rice from Battambang to the capital (See: Chapter II.B, Agriculture).

c. Present situation

According to recent discussions with NGOs of Kampuchea, it seems that responsibility for airfields is borne by the Ministry of Internal Affairs and the military. However, civil aviation has been resumed by a state-owned corporation, Kampuchea Civil Aviation. Since June 1989, there have been scheduled flights between Phnom Penh and Ho Chi Minh City twice a week, Phnom Penh and Hanoi twice a week, and Phnom Penh and Vientiane once a week. Flights between Phnom Penh and Viet Nam are shared between Kampuchea Airlines and Viet Nam Airways. An Aeroflot cargo flight stops in Phnom Penh twice a month. Travellers proceeding from Phnom Penh to Bangkok may make same-day connections via Air France in Ho Chi Minh City two times per week on Mondays and Thursdays. Same day air travel from Bangkok to Phnom Penh via Ho Chi Minh City is possible only once a week on Thursdays. Road travel to Ho Chi Minh City to make air connections to Bangkok became possible only in late 1988. To travel by road to Phnom Penh from Ho Chi Minh City, after a flight from Bangkok, requires an overnight stay in Ho Chi Minh City. In January 1989, Kampuchea Civil Aviation opened weekly passengers flights between Phnom Penh and the western border province of Siem Reap-Oddar Meanchey, largely to accommodate tourist traffic to Angkor Wat. Scheduled weekly flights to Battambang and Stung Treng have been announced, but have yet to begin operation.

Kampuchea Airlines has two Soviet-built jet aircraft as well as at least three smaller turbo-prop aircraft, all of which are operated with Soviet technical assistance. In April 1989, extension of the runway at Pochentong began. The longer runway will accommodate larger aircraft. Work on the runway, financed by the Phnom Penh authorities, will be completed by mid-year. Meanwhile, the airport at Siem Reap has deteriorated. The terminal building was partially destroyed during the 1970s and the runway will require upgrading before it can be used by international traffic.

Several international carriers such as Thai International, Singapore Airlines, Japan Airlines reportedly are negotiating landing rights for direct flights. Such traffic will probably require an upgrading of both air traffic and terminal facilities.

Although the present conditions of other smaller airfield are clearly not secure, some 30 airfields are available for use. However, all weather operation seems to be not possible because of lack of radio facilities. Similarly, most of these smaller airfields also lack passenger facilities. Studies to improve facilities at remote provincial cities from Phnom Penh such as Battambang, Kompong Som, Kampot, Kratie, Samroang, Koh Kong, Lumphat, Sen Monorom and Stung Treng, etc. will be required.

d. The sector's needs

The kinds of development assistance which may be needed are summarised below:

(1) Technical assistance to Kampuchean Airlines including expert services, scholarships and provision of training equipment. Key areas of assistance would include air transport economics, the organisation and administration of licensing procedures for commercial aviation, and the structure and expansion of the national air carrier.

(2) Studies to upgrade and expand the air traffic and terminal facilities at Phnom Penh and Siem Reap airports, as well as to improve existing airport facilities at other cities including Kompong Som, Battambang, Kratie, Samroang, Koh Kong, Lumphat, Sen Monorom and Stung Treng.

7. Telecommunications

a. Situation in the late 1960s

Domestic and international telecommunications services are provided by the Department of Posts and Communications of the Ministry of Transport, Communications and Posts. Telecommunication services were introduced in 1970 by the Ministry of Posts and Telecommunications which became independent of the then Ministry of Public Works in the late 1960s. At that time, Kampuchea had local automatic telephone exchanges at Phnom Penh (4,000 lines opened January 1961), Kompong Som (then Sihanoukville, 1,000 lines opened January 1968), Kompong Cham and Kompot (200 lines each, January 1968) and Battambang (1,000 lines under construction March 1970 using old equipment from Phnom Penh). The Phnom Penh switchboard was from PENTA CONTA (CGCT). The others were Type A OKI DENKI models. In 1969, there were 54 telephone stations, 4,372 subscribers, and 7,993 telephones for a population of about 6.8 million (0.1 phones per capita) (See: Chart IV.C.iv).

Interurban connections were by open wire and carrier working on open wire lines totalling 10,256 km of 120 circuit lines; of which direct liaison by standard carrier, 23 lines, by omnibus circuit 76, and by natural circuit 21. Radiating from Phnom Penh there were 6 circuit lines Kompong Cham, 8 to Kompong Som, Battambang 3, Kampot 3, Siem Reap 2, Takhamau 1, Prey Veng 2, Kompong Speu 1, Svay Rieng 1, Takeo 1, Kompong Thom 1, Kirirom 1, Memot 1 and Kompong Chhnang 1. There were many omnibus circuit lines and radio liaison between principal cities and remote localities. Toll calls to or from Phnom Penh accounted for nearly 80 percent of total interurban toll calls between principal cities. The 1970 Japanese OTCA Survey Report on expansion of telecommunications and broadcasting recommended priority to erection of more interurban circuit lines originating from Phnom Penh.

International telecommunications were carried via a short wave transmitting station at Kambaul, a receiving station at Pochentong and a central station inside the Ministry. There were three 20 kW transmitters and two telephone and five telegraph receivers. Approximately 8,800 communications to Shanghai, Hong Kong, Tokyo, Singapore, and Paris accounted for 95 percent of all international telecommunications in 1970. Telegraph communications between Phnom Penh and Paris, Osaka, Saigon, Shanghai, Vientiane, Peking and Hanoi amounted to 14,500 in 1968.

b. The present status

According to the Ministry of Transport, Communications and Posts, the existing automatic switch board in Phnom Penh is from PENTA CONTA. There are some 5,000 subscribers. Some 2,200 telephone numbers are in service. There are also automatic switchboards in Battambang, (600 subscribers), Kompong Cham 499, Kompong Som and Koh Kong, 100 each. Although there is at present no detailed inventory, it seems that some telephone equipment has survived and is in service. However, it can take several hours to establish a connection and service is often available only from the Post Office.

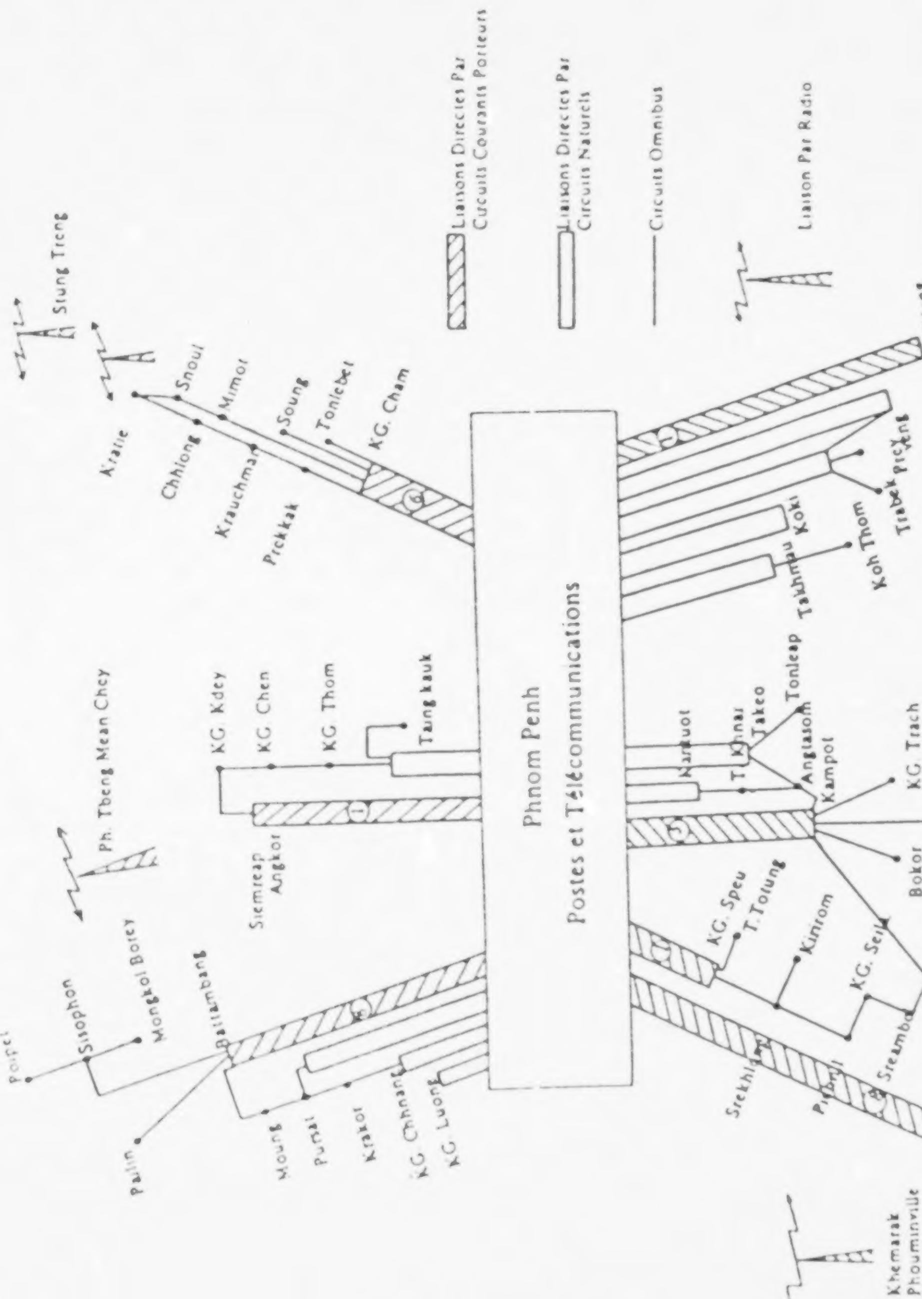
An Inter-Sputnik ground satellite station, built with assistance from the USSR in 1986, has been in operation since the beginning of 1987. Telephone communications between Phnom Penh, Moscow and other countries were established in January 1987 and, since March, telephone communications have been established between Phnom Penh and Hanoi. A co-operation agreement on broadcasting during 1987-89 was signed with the USSR.[12] Outgoing international calls are hence possible within 10 minutes to an hour. In coming international calls are possible through Ho Chi Minh City via satellite although it sometimes takes several hours to establish contact.[13]

The Ministry of Transport, Communications and Posts has discussed the further development of the telecommunications sector, including an alternate satellite link, telex and facsimile services, and installation of a new telephone exchange, with a number of foreign telecommunications companies, including an Australian company (Overseas Telecommunications Company International/OTCI).

There currently is no public telex or facsimile service. Telegraph is available with any foreign country, the system completed in the

Chart IV.C.iv

INTERNAL TELECOMMUNICATIONS NETWORK IN 1970


Liaisons Directes Par Circuits Courants Porteurs
Liaisons Directes Par Circuits Naturels
Circuits Omnibus
Liaison Par Radio
Phnom Penh
Postes et Télécommunications
Stung Treng
Kratie
Snoul
Mimot
Chhlong
Krauchmar
Soung
Tonlebet
KG. Cham
Prekkak
Svay Rieng
Prey Veng
Trabek
Koki
Koh Thom
Takhmau
Ph. Tbeng Mean Chey
KG. Kdey
KG. Chen
KG. Thom
Taung kauk
Siemreap Angkor
Takeo
Tonleap
Angtasom
Kampot
KG. Trach
Kep
Bokor
KG. Speu
T. Tolung
Kirirom
KG. Seila
Veal Rieng
Sreambel
Pichnil
Sihanoukville
Khemarak Phouminville
Poipet
Sisophon
Mongkol Borey
Battambang
Pailin
Moung
Pursat
Krakor
KG. Chhnang
KG. Luong

Source: Preliminary Survey Report on Expansion Programme of Telecommunication and Broadcasting Network, OTCA Japan, May 1970

1960s seeming to have survived. All mail to and from Kampuchea is currently routed through Ho Chi Minh City and Moscow. In 1988, the Post Office handled some 550,000 pieces of mail.

A plan to expand the domestic telephone system, including a microwave system to link Phnom Penh to the principal cities, was once developed in the late 1960s. The microwave system was intended primarily for public telecommunications services but radio and television relays were also considered. Total cost of the plan in October 1968 was estimated at US$6.62 million (1 US$ = 55 riel). The 1970 Japanese OTCA of Japan (now JICA) Report estimated the construction cost of a microwave system between Phnom Penh and Battambang at 116 million riels (US$2 million at 1970 prices). Considering the expected growth of telecommunications between the two cities in the near future, the cost and engineering studies for the project should be updated.

c. Broadcasting

The Inter-Sputnik television relay station went into service early 1987. The national television service, the Bayon Satellite Network, broadcasts some hours per week in Russian in addition to 10 hours per week of Khmer-language programmes. Television is available only in Phnom Penh, reaching an estimated 15 percent of households. The network reportedly earned US$95,422 in hard currency in 1987. Some of the earnings stem from export of footage to East European and other news agencies. The State radio service (The Voice of the People of Kampuchea) broadcasts a total of 45 hours per week, with relay stations throughout the country. Radio transmissions are predominantly in Khmer, with some French and English news.

d. The sector's needs

The kind of development assistance which may be needed is summarised below:

- A master plan for development of the internal telecommunications network and construction of microwave circuit lines between Phnom Penh and Battambang.

The domestic telephone system is both old and limited, even between the principal cities. As a first step towards system rehabilitation and expansion, general telecommunications demand needs to be established. The appropriate response would involve both technical and cost considerations. But, since Battambang is expected to become a major resettlement centre involving the concentration of both aid services and commodities distribution, a microwave circuit line between Phnom Penh and Battambang should be created immediately. Consultants will produce an inventory, review physical and organisational rehabilitation capabilities and recommend an optimal reconstruction and development programme. The project will include the designs and supply and installation of microwave systems or other optimal alternatives to communicate between Phnom Penh and Battambang.

It is stressed that the emphasis on the Phnom Penh-Battambang linkage should be a first step towards the urgent re-establishment of telecommunications throughout the country, so as to ensure contacts to be made between the capital and the provincial towns.

D. HUMAN SETTLEMENTS

1. The Situation during the 1960s

As already stated in Chapter I.C on Population and Demography, Kampuchea was still a predominantly rural country in 1962, when only about 12 percent of the people lived in urban areas.[14] This proportion was thought to have been increasing slowly during the later 1960s, but not at a great rate. However the capital, Phnom Penh, had by then attained a high degree of "primacy" or economic dominance, in the country. It was - and still is - the seat of government, of economic power and influence, the main industrial centre, and the focus for culture, learning and the arts.

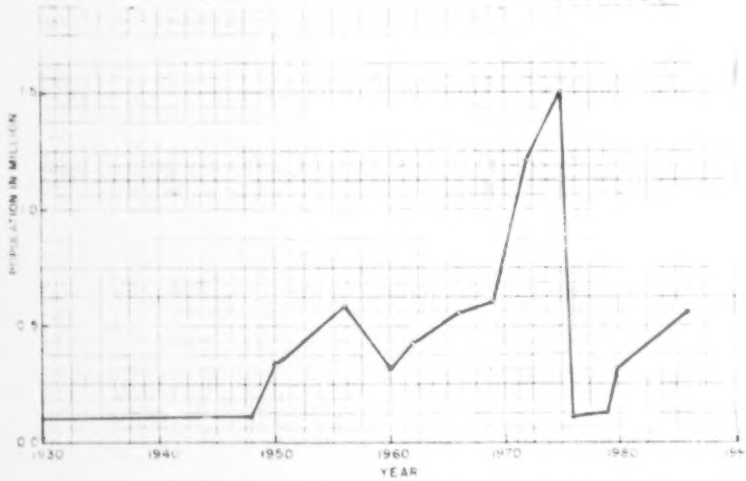
The Government was beginning to regard this excessive centrality with some concern. Evidence of this is in the proposal in the late 1960s to develop Sihanoukville (Kompong Som) into a second pole of industrial growth. According to the World Bank Report of 1970, this was to be achieved in part by setting up a "Free Zone" in the town.[15] An industrial estate had been located, but by the late 1960s it had not been further developed due to a number of factors, not the least being shortage of funds. Furthermore, even those public sector investments which had been located in Kompong Som were facing difficulties due to lack of skills and labour generally. As already noted in Chapter III, the beginnings of industrial activity were already to be seen in Battambang, Kompong Cham, Prey Veng, and Kompong Thom; but this took place more in response to market imperatives than to an active government policy. In any case, the policy itself had achieved no real measure of success before the country was overtaken by the events of the 1970s.

In more general terms, the Government had recognised that the extreme differences in standard of living between Phnom Penh and the remainder of the country was such as to require action. This was to take the form of measures to reduce the incentives for rural dwellers to move into urban areas by:

> *...introducing more health concepts for housing construction, building village roads, dispensaries and schools, and introducing modern means of communications including radios - and probably at some future stage television as well. There is indeed a whole philosophy about gradually reducing the difference not only in the living standard between the cities and the countryside, but of the difference in the way of life. The objective is to stop migration from the country into the towns, and the most radical way to achieve this is the provision, in the villages, of all the amenities that have so far made people move to city agglomerations, in other words, transform the "rural habitat" up to city standards. From a cursory glance at the villages, it would seem that such an objective is lacking reality. Indeed, the difference in urban and rural living standards has kept increasing so far.*[16]

Chart IV.D.1

POPULATION TRENDS FOR PHNOM PENH 1930 - 1986



Graph based on original prepared by Mr Kry Beng Hong as obtained through NGO channels

This paragraph is quoted at length to indicate that the danger of allowing too wide a disparity to arise between the capital on the one side and those in the rural areas on the other had been recognised, but that very little had been done to correct this. Although it may well be difficult to introduce such a policy at present, it should perhaps not be lost sight of. According to some analysts, one of the factors causing the emergence of radicalism in the 1960s was the widening gap between Phnom Penh and the remainder of the country. Unless this disparity is addressed, new risks to the stability of the country may well appear.

The urban dimension of such a policy is discussed below.

2. The Problems of Phnom Penh

Very few cities in the modern world have endured such vicissitudes as Phnom Penh has during the past forty years. Twice in the course of a single generation, the city has had to accommodate hundreds of thousand of refugees from areas close to war zones; and twice also, these people have left. The last of these movements took place during the mid-1970s, when, after being flooded by some 1.5-2.0 million refugees, it was forcibly evacuated. Many of its citizens were not able to survive the rigours of the next 3-4 years. The accompanying chart demonstrates these trends.

During the period 1975-79 the city as such ceased to exist: apart from a few privileged people, it merely provided barracks for the single men who were employed in factories within it, who, according to one source, numbered about 125,000. Its infrastructure which, according to accounts at the time was already in need of repair and maintenance, suffered further extensive damage; its housing stock deteriorated; and its public buildings and temples were appropriated for other uses. By 1979, when it was re-possessed, it was in effect a dead city.

Today, there are certainly signs of an energetic revival. To quote from a recent (June 1989) edition of Newsweek:

The signs of commercial bustle, which almost resemble a boom, represent a stunning revival for a city that was once left for dead... Only four years ago, downtown shops were mostly shattered or were occupied by squatters. Today they are open for business and thriving: restaurants, pharmacies, tailors, hair-dressers, machine shops, liquor, music and video stores and even car and motorcycle washers, almost all of them privately-owned. The city's main markets...are thronged with shoppers buying a wide variety of mostly imported goods...[17]

Beyond this bustle, there lies a more forbidding reality, which has been documented by a report by Eva Mysliwiec in mid-1986.[18] She confirms that in 1979, soon after the defeat of the Khmer Rouge, the population of the city was only about 120,000. The rate of increase was very rapid during the early 1980s as more and more families moved in. Most of these, perhaps more than 70 percent, were not residents of Phnom Penh at all before the evacuation. They came in from the provinces and took up residence in the apartments and other buildings of the city, and were unused to city living.

Although there have been some improvements during the past two years since this was written, the situation remains serious.

The city of Phnom Penh comprises several main zones: a densely built up central area, in which a large number of people are housed in apartments; a "suburban zone" with a mixture of apartments, villas and temporary accommodations; a "peri-urban zone" with traditional housing; and a zone where industries are located as well as people in traditional housing. It is in the central area that the main problems lie. The prolonged period of evacuation caused deterioration and even collapse of buildings: roof leakages, wall cracking, foundation subsidence, windows and doors detachment and so on; and this was rendered worse in the immediate post-occupation period when some houses were cannibalised for materials to repair other structures.

According to government statistics in a paper prepared in 1985 and quoted by Mysliwiec, of the 122,000 dwelling units in Phnom Penh in 1970 some 67 percent were destroyed or seriously damaged between then and 1978. By 1986, a great number of these had been repaired, but such is the measure of overcrowding in the city that many families *were found to be living in schools, theatres, restaurants, old hotels or other buildings abandoned or condemned because of dangerous structural problems.* Under recent legislation, ownership has been given to families who were already in residence; this is expected to have a beneficial effect on general housing conditions, but will only partially alleviate the more profound problems of the city, which are associated with a breakdown in the basic infrastructure.

By the mid-1970s, the town's drainage and sewerage system was already considered unsatisfactory, with parts being blocked or not working efficiently. By 1989, the status of the whole system had become catastrophic. It was summarised in a report by John Tuite.[19] Although he considers the city's drainage system to be in principle well conceived, he identifies the following problems:

- *The internal drainage and sewerage system of Phnom Penh is in such poor condition that local flooding is a relatively frequent occurrence during downpours. Existing drainage pipes become silted during the dry season when drainage flows and the associated drainage velocities are low. This promotes the deposition of silt in both the pipes and open canals reducing their carrying capacity.*[20]

- *Pumping capacity is very restricted due to the frequency of system breakdown, the unreliable electricity supply and the limited pumping capacity available. All of the pumps have reached the end of their economic life having been installed as far back as 1960 (Pumpstation 1). Consequential overloading of the electric motors and diesel engines is causing constant maintenance difficulties. This overloading is most likely caused by reduced pump efficiency as well as general wear and tear.*

- *The canals do not have sufficient capacity to convey stormwaters to the evacuation points because silting in the dry season has reduced their carrying capacity. The carrying capacity is reduced further by numerous road culverts having been established using pipes of inadequate capacity.*

Work is going on at two levels. At the central level, the Municipality has an active programme of replacing broken and blocked sections of the sewerage network but is restricted in its progress by a general lack of funds, materials and machinery. It is also in urgent need of technical assistance to design and reconstruct the drainage and sewerage systems. There have been a number of missions providing advice on the work to be done, particularly that which was commissioned by NOVIB and undertaken by Jack Overkamp for Fondation CODE, as well as the Tuite study already mentioned. Overkamp has recommended as an absolute priority the establishment of a maintenance programme for the main drainage conduits in the city which would include their cleaning, repair, renovation and replacement, and this recommendation has been embodied in a project profile which describes a feasibility study for the undertaking of this work.

Of equal importance, however, are the "grassroots" activities of NGOs such as PADEK and OXFAM, whose objective is to improve public sanitation at the local level. The programme has been in process for 10 years, and is now in its third phase. Under this latest phase, a pilot project has been initiated which will improve garbage collection in two markets, hygienic conditions in garbage dumps, the transportation capability of the municipality, and to use organic waste productively. By undertaking such work at the ward level, they seek to inculcate sanitary conditions to the people living in them. But the impact is limited at present because the major works described above are still awaiting implementation.

This programme should clearly be completed and extended under firm financial arrangements, since its contribution to the improvement of sanitary conditions in Phnom Penh is vital. It is strongly recommended that this should continue under the direction of the two NGOs concerned, thus capitalising on the experience which they have gained over the past 10 years.

Concerning the water supply system Tuite comments that:

...The Phnom Penh water treatment works are currently producing about 60,000 m^3/day but are capable of producing 200,000 m^3/day. However, because of electricity production constraints pumping only occurs in the day. During the day pressure in the water-supply pipelines is as high as 30 metres but falls to zero at night when pumping ceases. Whilst the sewerage system and the drinking water reticulation system are independent in design the large number of points of leakage and poor connection in both systems allow polluted supplies to be transferred from the sewerage to drinking water system during the night when a pressure differential exists. This means that whilst statistics are limited, diarrhoeal diseases flowing from the polluted water supply and low levels of environmental hygiene have resulted in a high percentage of child mortality (said to be about 20 percent) and are a major primary and secondary cause of morbidity and mortality. About 40 percent of households receive a water supply of about 30 litres per person assuming the city's population is 600,000.

This situation could be alleviated by an improvement in electricity supply, which is reported upon elsewhere. OXFAM has been concentrating on the supply of clean drinking water through the up-grading of the water treatment plant, an activity which is essential and should be continued.

The only effective comprehensive solution to these problems lies in the preparation of a new physical planning study for the city, which would review the condition of the city in all its aspects, and make proposals for upgrading those services which are currently deficient within the context of a forward-looking strategy for the future development of the city. In the words of a recent paper prepared by the municipality of Phnom Penh:

...In order to develop Phnom Penh [in such a way that it is] conformable to the state guidelines (esthetic, physical, demographic, economic, political, etc), a framework or master plan is required, and all governmental [plans and] conceptions must be considered...

Such a study would have to be linked into budgetary processes so as to ensure that the programme of urban renewal and redevelopment is properly funded. A project profile for this exercise is included in the project profiles in Volume II.

3. Urbanisation in Kampuchea

Outside Phnom Penh, urbanisation is taking place with the growth of the smaller provincial capitals. This process is at present quite slow, with 88 percent of the people still living in the rural areas of the country. But as the economy picks up speed, there will surely be an increasing flow of migrants into the cities, and it is essential that policies are devised to ensure that as few as possible of these people find their way into Phnom Penh, where conditions are already bordering on the calamitous. To achieve such an objective, it will be necessary to reconsider measures which the Government had in view in the 1960s, of improving general conditions in these smaller urban areas so that they provide a general economic and social environment closer to that in the capital.

At present, there are only two properly constituted municipalities in Kampuchea, Phnom Penh itself and Kompong Som. The other urban centres within the country are the centres for provincial and district local governments. They are administered by their respective governments, with assistance from the central Government as required. Under the present regime, the provincial administrations enjoy considerable autonomy in the preparation of their budgets and the ordering of their priorities. They prepare 5-year plans for the development of their respective provinces, and are expected to finance them from resources which are retained from taxes. They are, however, gravely handicapped by lack of funds and technical/management skills, and progress in the reconstruction of these smaller urban areas is slow. The need to re-establish the economy on a satisfactory basis has led to emphasis being placed on such sectors as agriculture, irrigation and water supply rather than town and city reconstruction.

The condition of these smaller urban areas is similar to that of Phnom Penh itself; and although revival is taking place in some of them, (see below) in many cases the effects of war and neglect are still very much apparent. Because they are much smaller than Phnom Penh, their condition gives less cause for alarm. But they would benefit from a programme of urban reconstruction, taking into account the means at their disposal. For this reason, it is suggested that a project be initiated to develop a national urban development strategy which would review the current status of all of the main urban areas in Kampuchea and assess their present and possible future role in the development of the country as a whole. Based on such review it would be possible to draw up realistic investment plans to upgrade the towns on a phased and systematic basis. A project profile has been drawn up for this.

Although these small towns suffered considerable damage, many of them are taking part in the return "boom" already noted in Phnom Penh. The larger towns, such as Battambang, Serei Sophon, Kompong Cham have newly opened markets; many already have a growing economic base: e.g. Battambang, jute; Kampot, ocean going fishing, cement; Kampong Cham, textiles. Some such as Sisophon, the "gateway" to Thailand, are likely to assume greater importance as the country opens up. But others, particularly those in the less populated northeastern parts of the country, remain untouched by these developments, and it is as much to these less fortunate areas that an urban development strategy would be addressed, as to the comparatively more prosperous towns.

4. Angkor Wat

It will be inevitable that, as the country opens up, tourist interest will revive in the magnificent temples in Angkor, and this location will once more become part of the Southeast Asian tourist circuit. Tourism and the cultural importance of Angkor are discussed in separate chapters elsewhere in this report; in this chapter, we are concerned with the physical aspects of these developments.

In reviewing the sector in general, the 1970 Report[21] noted that a major problem facing the country is that of protecting and servicing the major buildings of the Angkor Complex. There is a real danger, particularly in the present increasingly laisser-faire climate that uncontrolled hotel and other related developments will destroy the settings of the temples, and that they will be subjected to other environmental risks as the flood of tourists once more increases. A comprehensive physical plan should be prepared as a matter of some urgency which will regulate land use developments, plan infrastructure and in general preserve the monuments in their present environment. Such a proposal was under consideration by the UNDP in the late 1960s; it should be revived.

Priorities

In summary, the following activities should be undertaken in the human settlements sector:

- prepare a physical plan for Phnom Penh which will provide a basis for future development proposals;

- provide immediate assistance to upgrade Phnom Penh's water supply, drainage, and sewerage systems;

- initiate measures to formulate an urban development policy whose objective would be to reduce the disparities between the capital city and the smaller towns; and,

- prepare a physical plan for the Angkor region so as to control its future development.

Notes to Chapter IV.A-C

1 United Nations, Atlas of Physical, Economic and Social Resources, September 1968.

2 Pamphlet: "Viet Nam Railways and Urban Transport Show, 24-27, October 1988."

3 Ministry of Transport, Communications and Posts, 1989.

4 According to the UN Atlas, in 1968 there were 75 concrete and 117 steel bridges of 10-20 m, plus 14 steel bridges of 20-30 m in the Phnom Penh-Poipet line. The Phnom Penh-Kampot line (Kampot line (Kampot-Kompong Som then not in service) contained eight 10-20 m, twelve 20-30 m and three 30-70 m concrete bridges, plus three steel bridges of 35-105 m, for a total of 232 bridges.

5 UN Atlas of Physical, Economic and Social Resources, September 1968.

6 "Country Report No. 3, 1988, Indochina: Viet Nam, Laos, Cambodia," Business International.

7 Ministry of Transport, Communications and Posts, July 1989.

8 FAO/WFP/UN Mission, Assessment of the Food and Agricultural Situation, May 1988.

9 Ministry of Transport, Communications and Posts, July 1989.

10 ECAFE, Inspection Report on the Transport Situation of the Khmer Rouge Republic, July 1971.

11 World Bank Report 1970.

12 "Country Report No. 2, 1987, Indochina: Vietnam, Laos, Cambodia," Business International.

13 Discussion with NGOs of Kampuchea, July 1989.

14 No attempt is made in this report to define the meaning of "urban areas" in the statistical sense, but as a general guide, these are considered to be areas with concentrations of more than 10,000 people.

15 World Bank Report para 123.

16 World Bank Report page 216.

17 Newsweek, June 26, 1989, page 17. This impression is confirmed in official documents by NOVIB: Report of a Mission to Kampuchea, March 1989, page 10.

18 The reference in the paragraphs that follow are from "Sanitation Survey Mission to Kampuchea," by Eva Mysliwiec, June-July 1986, prepared for NOVIB.

19 Kampuchea: Phnom Penh Drainage System Feasibility Study Report, Feb/March 1989 by John Tuite, New South Wales Department of Water Resources. Report submitted to ADAB. The quotations are taken from pages 11, 13, and 19 of this report.

20 Electricity Supply is discussed in Chapter, IV.B, Energy.

21 World Bank Report, para 181.

V. Social Services and Culture

A. HEALTH SERVICES

1. Historical Perspective

a. Conditions before 1970

The health care system in Cambodia in the 1960s reflected an era when "health" was considered to mean medical service delivery. Hospitals and clinics were evident, and training for professional personnel was well established in the School of Medicine and Paramedical Sciences (*Faculte de Medicine et des Sciences Paramedicales*) and the School of Pharmacy in the Royal University in Phnom Penh.

However, the general condition of health of the populace was less encouraging. A United Nations study in 1968 stated briefly, *Environmental conditions are generally poor and constitute an important cause of the prevalence of disease transmitted through contaminated food or water. Some urban communities suffer from lack of adequate and safe water supplies, storm water and waste water drainage, excreta and refuse disposal facilities. Most of the rural communities lack sanitary facilities. The most prevalent disease is malaria. Other principal diseases are dysentery, tuberculosis, diarrhea, hepatitis, typhoid, leprosy, dengue fever etc. Most deaths occur in infancy.* The major causes of death in Cambodia included malaria, tuberculosis, pneumonia, dysentery, and measles.

The report goes on to say *The favorable situation of being a large rice producing area is largely responsible for the widely accepted view that the nutritional situation of the population is no reason for concern. But malnutrition is a persistent menace to the population, particularly in rural areas. The major causes of malnutrition are a shortage of desirable protective foodstuffs, the lack of knowledge about them, and prejudices and taboos against the use of them*, an apparent reference to the lack of vitamins and minerals in the diet due to limited consumption of vegetables and fruit.

Nonetheless, in 1969 Cambodia is listed as having 99 hospitals (including maternity hospitals), with 5,462 beds. All of them were run by the government, with the ones serving the workers at the rubber plantations listed as "private". In addition there were 26 dispensaries and health centres, 191 infirmaries, 66 "maternity hospitals", with 644 midwifery stations, and 340 pharmacy and drug supply houses.

b. The impact of the 1970s

The civil war of the first half of the 1970s quickly ended what rural health service system there was, and strained very heavily the urban facilities which had to try to cope not only with the normal health problems of the population, but those created or exacerbated by the war. The hospitals in Phnom Penh at the end of the war are described as completely overwhelmed by the demands placed on them, with multiple occupancy of hospital beds, few supplies, and patients dying untended in hospital corridors.

After 1975, the health care system that had been set up during previous regimes was abandoned. Hospitals were left empty, and very often the equipment was smashed or scattered. Many of the remaining doctors were killed, sometimes after they had transmitted basic skills to health cadres.

2. The Past 10 Years

a. The inherited situation

Health problems in Kampuchea in 1980 were severe, with many people close to starvation. Although living conditions during the late 1970s varied from region to region, in general the Khmer population had subsisted on inadequate rations of food distributed through communal kitchens. During the turmoil of 1979, foodstocks had been destroyed, plundered or abandoned, and rice fields left unplanted. The resulting situation prompted the international relief operation, an important component being the massive importation and distribution of foodstuffs.

There was no functioning health service in Kampuchea in 1979. The Khmer Rouge had sought to replace all existing "western" institutions with "clinics" which were often no more than large, reasonably sturdy thatched sheds dispensing some herbal medicines. Less than 10 percent of the 500 or so Khmer doctors who were in Cambodia in 1969 had stayed in the country and survived this period. Hospitals and health centres had been destroyed by warfare or were in disrepair due to neglect or having been used for other purposes. The most basic equipment was almost completely lacking. The country had virtually no medical supplies.

The re-establishment of a functioning health care system was one of the stated priorities of the new government. The 1981 Constitution guaranteed free health care to all, with an emphasis on maternal and child health. Given the lack of capacity to deliver health services to all at that time, the statement has to be regarded as a goal rather than a fact.

Four years later, the 1985 Fifth Party Congress proposed the strengthening of the health care network down to the commune and village level. The quality of health protection for mothers, children, ethnic minority populations, the people in border regions, and elderly people was to be emphasized, as was the organization and promotion of "movements" for hygiene, prophylaxis against diseases and epidemics, especially malaria. The Congress also advocated the combination of modern and traditional practices and the rehabilitation and expansion of the country's pharmaceutical production capacity.

However, to carry out the task, the country had to rely on the few surviving doctors who had generally been trained in a system that was now 30 years out of date. Most were health care practicioners, and few had significant administrative experience prior to 1979. More importantly, the structural problems that endanger health, such as the level of income, housing, sanitary infrastructure, drinking water, and transportation, were also in disarray. Yet in a relatively short time, the outlines of a health care system were drawn, even though it proved extremely difficult to fill in that outline with substance.

b. The current health care system

At the base of the health system are the district (*srok*) health centres, and commune (*khum*) infirmaries. *Khum* infirmaries, the most peripheral health care units, each provide basic health care to several villages. In 1988 there were 1,457 *khum* level clinics or infirmaries, each serving up to 8,000 people. Commune clinics are normally staffed with two to five persons, usually primary nurses and primary midwives, who have received one year's training at the provincial level after completion of primary school.

Patients who cannot be treated at the *khum* infirmaries are referred to the district health centres, which serve as the loci for both preventive and curative services. More serious cases may be referred to the provincial hospital, which requires transportation and funds that may not be available. In 1988 there were 154 district health care centres in Kampuchea, some of which were no more than palm-thatch buildings with earth floors and a few beds. The district health centres may be headed by a medical assistants with four years of post-secondary education, but more commonly by State nurses and midwives, who have three years of post-primary education.

Hospitals based in provincial capitals offer a wider range of medical care and more qualified health care personnel. A lack of materials and equipment, however, limits the quality and care. All levels of health facilities suffer from nonexistent or inadequate water supply, latrines and electricity. Although no statistics on the utilization rate of hospital beds are available, direct observation shows a low occupancy in district and some provincial hospitals.

Few medical centres at any level have more than a meagre and wholly inadequate supply of drugs and medical equipment. Personnel are in place, but those at the commune level in particular have received inadequate training, many lack practical experience, and receive almost no supervision or support. The lack of professionally qualified medical personnel at district and provincial levels also is acute, as is the lack and poor distribution of drugs and other medical equipment and supplies.

The 1981 Constitution declared that all health care services were to be provided without charge. In practice, patients have had to purchase drugs and other medical supplies since they are generally not available in the health facility, and to provide their own food or pay some 20 riels a day. Many medical staff also charge for private consultations as one way of supplementing their meagre State salaries. Rural midwives may conduct prenatal examinations in the infirmary, but deliver the child on a private basis at the mother's home. The May 1989 amendment to the Constitution permits private medical practice, including private hospitals and clinics. Consideration is being given to asking patients to pay for drugs or consultations.

c. Institutional structure

The Ministry of Health has overall responsibility for the delivery of health care services. However, as with other sectors, implementation responsibilities rest with the provinces and municipalities which operate autonomously with their own staff and budgets, and without supervision or control by the central level. Each province and municipality has its own health care structure, with activities divided between Curative (hospital) and Preventive services. The organizational structure of the Cambodian health care system as of June 1989 is given in Chart V.A.I.

The Permanent Vice-Minister is in charge of the Department of Preventive and Curative Medicine, which oversees the health care delivery system. This system includes the central hospitals, provincial and municipal health services (hospitals,

Table V.A.1

COMPARISON OF HEALTH FACILITIES
IN 1969 AND 1988

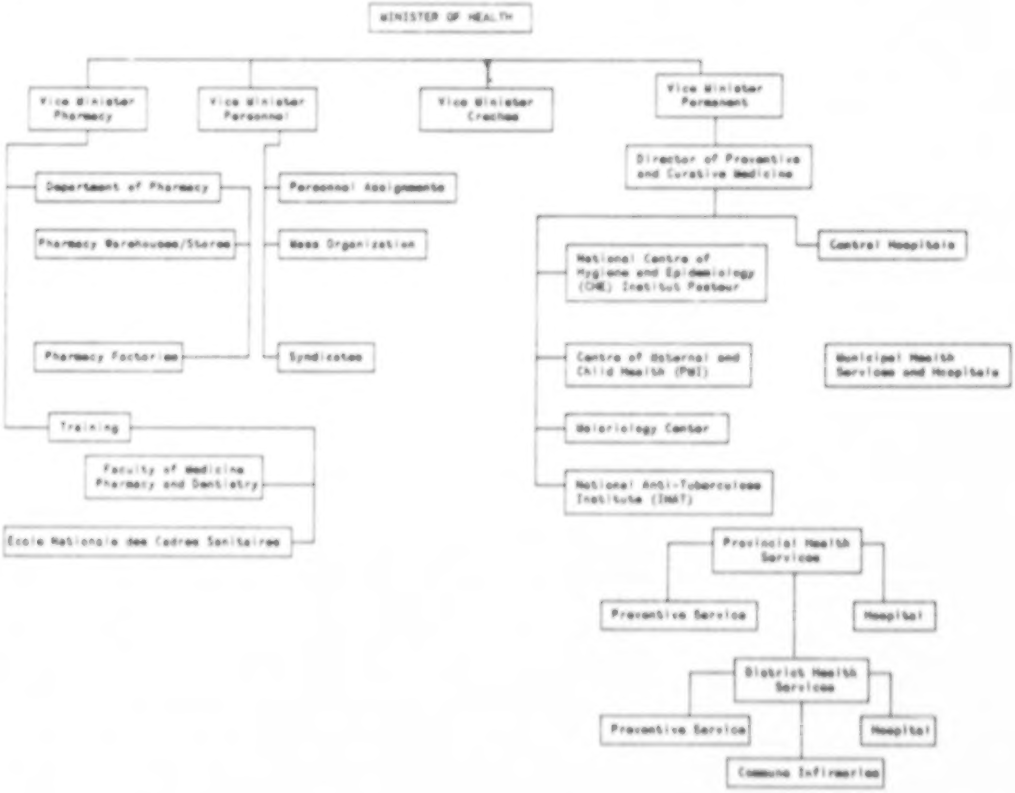
Facility	1969			1988		
	Phnom Penh	Provinces	Total	Phnom Penh	Provinces	Total
(a) HOSPITALS						
Public						
Central	7	)		9	)	
Provincial		33)	) 62	1	27)	) 188
District		22)		4	147)	
Private incl.						
Maternity	25	12	37	n.a.	n.a.	n.a.
Total	32	67	99	14+	174+	188+
(b) HOSPITAL BEDS						
Public						
Central	1654	)		2500	)	
Provincial		2046)	) 3700+	240	4258)	) 12,953
District		n.a.)		83	5874)	
Private incl.						
Maternity	989	773	1762	n.a.	n.a.	n.a.
Total	2643	2819+	5462+	2823+	10,130+	12,953+
(c) OUT-PATIENT AND PREVENTIVE FACILITIES						
Public						
Dispensaries	13	6	19	5	n.a.	5+
Health Centres & Infirmaries:						
District	47	403	450	4	150	154
Commune				27	1430	1457
Private	48	36	84	n.a.	n.a.	n.a.
Total	108	445	553	36+	1580+	1616+

health centres and infirmaries), a central blood transfusion service, and four key divisions: the *Centre National d'Hygiene et d'Epidemiologie* (CNHE), the *Centre de Protection Maternelle at Infantile* (PMI), the *Centre de Malariologie*, and the *Institut National Anti-Tuberculeux* (INAT).

The *Centre National d'Hygiene et d'Epidemiologie* is responsible for a number of key programmes, including the Expanded Programme of Immunization (EPI), water and sanitation (drilled, dug, and rehabilitated wells as a source of potable water, and latrine construction), the national communicable disease and dengue, leprosy and yaws control programmes, and health education activities. The CNHE also conducts epidemiological studies and is responsible for the Institut Pasteur. The *Institut Pasteur* was well developed before 1975, with a capacity to produce human and animal vaccines as part of a sophisticated diagnostic and production facility. It was destroyed by the Khmer Rouge, re-established in 1986, and has since received some assistance from the *Institut Pasteur* in Paris.

The *Centre de Protection Maternelle et Infantile* has responsibility for the health of women and young children, including the prevention of illness, nutrition and hygiene education, creches, the in-service training of midwives and child care workers, and shares responsibility with the Ministry of Social Action for a pilot community based project involving the prevention and treatment of childhood disability. In addition, the PMI has supervisory responsibility for a network of 31 RINE Centres (Rehydration, Immunization, Nutrition, Education) which developed as focal points for improved child and maternal health. Of the RINE Centres, 11 are located in Phnom Penh, 12 in provincial

Chart V.A.I


MINISTER OF HEALTH
Vice Minister Pharmacy
Vice Minister Personnel
Vice Minister Creches
Vice Minister Permanent
Department of Pharmacy
Pharmacy Warehouses/Stores
Pharmacy Factories
Personnel Assignments
Mass Organization
Syndicates
Training
Faculty of Medicine Pharmacy and Dentistry
Ecole Nationale des Cadres Sanitaires
Director of Preventive and Curative Medicine
Central Hospitals
National Centre of Hygiene and Epidemiology (CNHE) Institut Pasteur
Centre of Maternal and Child Health (PMI)
Municipal Health Services and Hospitals
Malariology Center
National Anti-Tuberculose Institute (INAT)
Provincial Health Services
Preventive Service
Hospital
District Health Services
Preventive Service
Hospital
Commune Infirmaries

capitals, and 8 at the district level. Since their inception in 1983, the role of the RINE centres vis-a-vis curative hospital activities has not been clearly established.

The *Centre de Malariologie* directs a national programme, organized in a vertical fashion, for the control and treatment of malaria. With the incidence of malaria, particularly in its chloroquine-resistant form, increasing each year in Cambodia, the Institut is interested in applied research as well as treatment and prevention activities.

The *Institut National Anti-Tuberculeux* directs a national programme against tuberculosis. The programme uses a standardized scheme for the diagnosis and treatment of the disease, which has a high incidence in Cambodia. The network of anti-TB workers and supervisory activities from the Institut in Phnom Penh is well organized but suffers from the continued threat of shortages in drug supplies.

The Ministry of Health operates three pharmaceutical factories, all in Phnom Penh, which produce some 90 different drugs and other pharmaceutical products. Most of the Ministry's US$1 million (plus 3 million roubles) budget for drugs is spent on the importation of raw materials for the pharmaceutical factories. Despite such production, the bulk of Kampuchea's drugs is obtained from socialist countries, from UNICEF and other aid agencies, and increasingly from private commercial importation from Thailand, Singapore, and Europe.

Table V.A.2
DISTRIBUTION OF HEALTH PERSONNEL, 1988

Category	Phnom Penh		Provinces		Total (country)
	No.	%	No.	%	
Medical Doctors	221	73	82	27	303
Medical Assistants	257	45	309	55	566
Nurses	522	29	1,296	71	1,818
Midwives	275	44	344	56	619
Aux. Nurses	869	17	4,284	83	5,153
Aux. Midwives	163	9.5	1,550	90.5	1,713
TOTAL	2,307	22.6	7,776	77.4	10,172

Expatriate Khmers often send drugs to families in Kampuchea, which are frequently sold on the open market. At least 60 percent of the drugs in the country are "private" and found in all markets, even in the provinces, as well as the rapidly increasing number of "*pharmacies bleus*" in Phnom Penh.

Although the Ministry of Health, through the CNHE, is responsible for national programmes of public health e.g. EPI, water and sanitation, dengue control, diarrheal diseases, it has no direct implementation responsibility and no province-based staff. Rather, such programmes are managed by staff working within the "Preventive Service" units of the provincial health structure, which are usually called "*stations d'hygienes*". This division of responsibility is also true for both malaria and tuberculosis programmes. The central level institutions can only issue directives and guidelines which may or may not be followed in the provinces. Similarly, the delivery of maternal and child health services is organized under the provincial PMI which has technical relations with the central PMI.

d. Health care personnel

By 1988 there were some 10,000 medical personnel in Kampuchea, including 425 doctors, 566 medical assistants, 1,818 State nurses, 619 midwives, 5,153 primary nurses, and 1,713 primary midwives. Table V.A.2 indicates the distribution of health personnel in Kampuchea in 1988.

As noted from the above figures, the distribution of health care workers, particularly doctors and medical assistants, is skewed in favour of Phnom Penh. Of the 27 percent of doctors who work in the provinces, all are based in provincial capitals as administrators of either the provincial health services or as medical directors/staff at provincial hospitals.

As there was only a handful of qualified medical staff left in the country in 1979, most of the country's present medical personnel have been trained since 1980. A Faculty of Medicine, Pharmacy, and Dentistry (*Faculte Mixte de Medecine, de Pharmacie, et d'Odontostomatologie*) was reopened in 1980 by bringing together more than 700 former students (out of several thousand) who had survived the Khmer Rouge rule. The School has since trained 412 doctors, 34 dentists, 222 pharmacists, and 812 medical assistants. Instruction at the Faculty has been in French, with more and more Khmer in use. Many senior personnel in the Ministry of Health and central hospitals serve as lecturers at the Faculty of Medicine, which has only 16 full time staff.

Doctors receive six years of training. Medical assistants study for four years. To encourage medical assistants to work outside Phnom Penh, those agreeing to serve in districts or frontier regions have been allowed to return to the Faculty after two years of service, with those serving in provincial capitals serving three years, while Phnom Penh-based medical assistants must have had four years of work experience before being accepted back into the Faculty to study for an additional three years to become doctors.

The *Ecole Centrale des Cadres Sanitaires* and regional health worker training centres in Battambang and Stung Treng (with 3 additional centres planned for Kampot, Kompong Cham and Phnom Penh) provide training for State (secondary) nurses and State midwives (3-year courses) and for laboratory technicians (3 years). Beginning in 1988 pediatric nursing was offered following the 3-year State nurse diploma, as was physiotherapy.

Primary nurses, primary midwives, and nursery workers receive one year of training at 17 provincial hospital training schools. By 1988 more than 7,200 primary nurses, 3,450 secondary nurses, 277 midwives, and 150 laboratory technicians had been trained since 1979.

Training and upgrading of staff at all levels is an important and necessary feature of the Kampuchean health care system, due first to the lack of trained manpower, and secondly due to the low basic education level. Difficulty in learning, lack of concentration (due to the trauma of the Pol Pot years or the physical difficulty of the study setting) and rote learning all necessitate attention being given to training and re-training ("*recyclage*") of staff. Such training is not professional upgrading as much as relearning. Training courses afford little practical or "hands on" experience, and there is little supervision of trainees.

Expanded training for existing health care workers has largely been conducted by foreign aid agencies. They have included short courses in maternal health, vaccination, cold chain management, health education, health managements, epidemiology, etc. and do not involve the teaching institutions.

The Faculty of Medicine, the *Ecole Centrale*, and particularly the regional and provincial health worker training schools are woefully under-equipped, with inadequate laboratories, insufficient teaching materials, and an almost complete absence of textbooks and journals. There are no Khmer language textbooks; students must copy their instructors' lecture notes from the blackboard by hand, or in some cases may purchase mimeographed notes. In contrast to the avowed commitment to primary health care, the health worker curriculum remains principally oriented towards curative care, and there is limited practical training, especially based on commune and district level health worker functions.

e. Childbearing: infant and child health

Probably less than half of the pregnant women in Kampuchea today receive prenatal checkups. Most of the estimated 318,000 births each year take place at home. About 38 percent appear to have maternity attendance. Many rural women prefer the services of traditional birth attendants or matronnes who are often experienced, but with limited training. Peripheral level midwives with limited formal training are in general underutilised. Commune infirmaries lack equipment to deal with even normal deliveries.

Because of the low attendance at childbirth, statistics on maternal deaths are lacking. Estimates are that there are 4-5 deaths per 1,000 live births. The causes are said to be tetanus gravidic toxemia and other complications of delivery, and complications of abortion.

Statistics on infant mortality in Kampuchea, such as they are, suggest a pre-war rate of about 125 per 1,000 live births, which nearly doubled by the end of the Khmer Rouge era to 210 in 1980. The rate was quickly brought down and is now probably 100-110. Neonatal tetanus appears to account for nearly one-third of infant deaths and is associated with attendance by untrained personnel and lack of immunization of pregnant women.

Again, exact figures are hard to obtain, but it seems that about 20 percent of all children in Kampuchea die before reaching the age of 5. The causes may be inferred from statistics on children who are brought to hospitals. These suggest that respiratory and diarrhoeal diseases are the primary causes of the deaths of children.

A UNICEF-sponsored survey of three hospitals in 1987 indicated that about one-fifth of all deaths of children under 15 years of age came from acute respiratory infections.

g. General pattern of diseases

The medical reasons for about two-thirds of the children who were brought to one National Pediatric Hospital during the year to May 1988 (out-patient statistics), and why they were admitted (in-patient rate) were:

Out-patients: 61,424	Percent
Acute respiratory infections	45.6
Diarrhoeal	18.9
Dermatosis	8.0
In-Patients: 8,833	
Diarrhoeal	23.5
Dengue Hemorrhagic Fever	17.4
Acute respiratory	16.9
Malnutrition	9.8

Diarrhoeal diseases appear to constitute one of the main causes of child morbidity and an underlying cause of malnutrition. Incidence increases at the end of the dry season and continues through the months of rainfall due to increased water pollution during these months.

Outbreaks of Dengue Hemorrhagic Fever (DHF) constitute a particular threat to young children. Environmental pollution facilitates breeding places for the *Aedes Egypti*. Outbreaks in Kampuchea were serious in 1983 and 1985, with a minor outbreak in 1987. For some reason, girls are more affected than boys. Most deaths from DHF were among children 3 to 6 years of age.

g. Disease prevention

In October 1986, UNICEF collaborated with health authorities to launch an Expanded Programme of Immunization (EPI). The programme's goal is to reach 80 percent vaccination coverage by 1990 of all children under one year of age, against the six target diseases (measles, poliomyelitis, diphtheria, pertussis/whooping cough, tetanus, and tuberculosis), as well as 80 percent of pregnant women against tetanus. The EPI used an accelerated campaign approach for a fixed period, followed by routine vaccination via commune infirmaries and district health centres. Table V.A.3 gives an indication of the progress of the programme.

While vaccination coverage of children has progressed satisfactorily, vaccination of pregnant women against tetanus has been less successful, with a mid-1988 estimated coverage of only 31 percent in Phnom Penh. This clearly relates to the current low coverage of maternal care, particularly of rural women.

Achievement of 80 percent immunization coverage by the end of 1990 is likely to be achieved. The success of the expanded immunization programme is linked more to effective direction or mobilization of the population by Government authorities at all levels than to popular demand and motivation of the population concerning child immunization. Success to date also has been achieved through the motivation and commitment of health care personnel who have worked very hard with no monetary compensation. In addition, the accelerated campaigns have used personnel borrowed from other Ministry of Health sections and from the Faculty of Medicine and the *Ecole National des Cadres Sanitaires*. Programme management as well as deficiencies in the cold chain system still have to be corrected to

Table V.A.3

PERCENTAGE OF VACCINATION COVERAGE, FEBRUARY 1988

Vaccination	Phnom Penh	Kandal	Prey Veng	Svay Rieng	Kompong Speu	Age of Child
BCG/Polio 0	98	98	82	90	94	birth
DPT/Polio I	98	98	83	81	95	6 wks
DPT/Polio II	93	95	76	79	94	10 wks
DPT/ Polio III	90	92	71	69	92	14 wks
Measles	88	82	67	68	62	9 months
Completely vaccinated	84	81	61	58	61	

Source: UNICEF-Phnom Penh

achieve integration of EPI activities into regular programmes and structures.

Since 1983, an integrated Rehydration, Immunization, Nutrition and Education project (RINE) has expanded under the *Protection Maternelle et Infantile* (PMI) unit of the Ministry of Health, with UNICEF and NGO support. At the end of 1987, there were 11 RINE Centres in Phnom Penh and 12 in other provinces. Some 2,000 children were getting care in the Phnom Penh centres, and 1,200 in the provincial centres.

The strength of the RINE approach is its integration of selected child health activities, including nutritional and general health education, promotion of breastfeeding and adequate weaning habits, promotion of family-based food production, nutritional rehabilitation of undernourished children through supplementary food supply, sustained immunization, promotion of oral rehydration, and referral to district or to provincial hospitals for more serious illnesses. However, there is a need for substantial increase of national leadership and better definition of strategies to integrate RINE centres to the regular health system, and to expand its scope to a Primary Health Care approach. So far, the risk exists of reducing this initiative to a pilot project, funded through external aid and hardly replicable and sustainable by local resources.

h. Malaria

Malaria has become a serous public health problem. The rapid increase in the number of confirmed cases of malaria is partly the consequence of the country's expanded capacity to diagnose malaria infection. However, greater population movement between areas of low and high malaria incidence has also contributed to the worsening of the situation. Civil defence workers in the hyperendemic forests and mountain areas of the country have been particularly exposed to infection.

A 1983 WHO mission studying the epidemiology of malaria in Thailand and Kampuchea found that while young adult males were most at risk of malaria infection, fatalities were seen mainly in children under 5 and women of childbearing age. Among those treated for malaria, under-5s were 133 times more likely to die than males aged 15-44. Women aged 15-55 were 43 times more likely to die than men of the same age. However, the number of men who were treated and died is very small. Table V.A.4 provides some figures.

Table V.A.4

INCIDENCE OF MALARIA IN KAMPUCHEA, 1981-86

Year	1981	1982	1983	1984	1985	1986
Total Population (millions)	6,608	6,677	6,961	7,145	7,331	7,671
No. of Cases c.70% falciparum	11,823	39,987	41,590	49,585	111,272	167,607
No. of deaths	369	286	145	111	671	431

Source: Centre de Malariologie, 1988

Efforts have been made to increase the local production of quinine and tetracycline with imported raw materials. Production still falls far short of needs. Mefloquine-sulfadoxine-pyrimethamine is not available in Kampuchea.

In 1985, two WHO experts assessed the nation's anti-malarial efforts and found that at that time all levels lacked experienced staff. Logistical and financial problems and the shortages of equipment, supplies, and medicines were severe. Permanent technical advisors were needed but unavailable to follow-up recommendations.

As it is, the control, detection, and treatment of malaria is not integrated in the health care structure. Because of managerial limitations and the cost of drugs, community-based measures of personal protection, early detection and treatment, and health education have not been effective.

i. Water and sanitation

Because of its fundamental impact on the health of individuals and on the delivery of health services, attention needs to be given to the availability of clean drinking water to the public at large and to health care facilities in particular.

Kampuchea has a wide water resource potential with abundant surface water, aquifers and seasonal rains. This potential is still not fully developed for agricultural and industrial use, nor for the provision of safe drinking water to satisfy domestic needs. (For further information on water sources, see Chapter I.A.)

A study conducted in 1986 by the *Centre National d'Hygiene et d'Epidemiology* with the assistance of UNICEF and the International Reference Centre in The Hague provides some general information on rural and urban sanitation.

Of 217 urban Phnom Penh families included in the study, only 120 had access to private or public latrines (55 percent). In some areas, 23 percent had water inside the house while 65 percent collected water from public taps. Water was available only during the day. Due to insufficient pressure, it reached only the ground floor of buildings. Water provided by the system in Phnom Penh was chlorinated, but was contaminated by going through broken pipes. Lack of drainage in the street contributed to stagnant water breeding insects. The sanitation problems of Phnom Penh are discussed in Chapter V.D.

Rural sanitation is also inadequate. The survey mentioned above revealed that most rural families have a strong preference for drinking water from rain or surface water, for reasons of taste. Well water is valued more for its assured availability than for taste or cleanliness. The study found that while well water might be utilized for bathing or laundry, some households took the trouble to walk a long distance to a river or canal to collect drinking water.

As for water storage, the study showed that some 55 percent of water storage jars were left uncovered. Jars were cleaned from once a day in some cases to once a month in others, with the majority of the households (66 percent) cleaning their water storage jars once or twice a week. About 41 percent of the households had a special container for drinking water, sometimes a kettle with boiled water.

The study also showed that 85 percent of the 208 households surveyed used the fields or the edge of the yard for defecation. A larger study in 1987 indicated that 13 of 25 villages (with a population of about 8,000 people in all) had no latrines at all. One family in seven - about the same proportion as in the 1986 study - actually had a latrine. But from the public health point of view because the latrines were for the most part shallow, open, and with no water available for washing afterwards, they could not be considered a public health asset.

Questions about sanitary habits indicated that while nearly half reported washing their hands before eating, less than one-third did so before preparing food, and only one-fifth after defecating or cleaning an infant or child's bottom.

The lack of easy access to safe water necessitates allocating a considerable amount of family labour to the collection of water (and firewood, in those families where water is boiled prior to human consumption). With a clean water supply, such time and energy could be directed to child care, income generating activities, or, for children, study, which might improve the quality of life for Kampuchean families and ease the work load of women in particular.

External aid to provide access to clean drinking water has come from UNICEF and a number of voluntary agencies. OXFAM (UK) is helping to restore the Phnom Penh municipal water supply. UNICEF has dug new wells, rehabilitated old ones, and provided pumps that have helped make water available to hospitals and infirmaries, and a population totaling half a million. OXFAM and Lutheran World Service have extensive programmes providing drinking water to villages in many provinces. A single, standardized approach is not possible, because of the variations in terrain, water table, and the like. However, many agree that providing the populace with clean drinking water could be one of the most effective health measures that could be undertaken.

3. External Assistance

Figures on Soviet, Vietnamese and other Eastern bloc aid are not, for the most part, available. Soviet aid provides much of the imported materials for the pharmaceutical factories. Vietnamese aid has included substantial technical assistance. Medical teams from the national red cross societies of Poland Czechoslovakia and East Germany have worked in provincial and national hospitals.

International aid has come primarily through UNICEF, and ICRC (and a number of national Red Cross societies in cooperation with the ICRC), and 20 or so additional non-governmental organizations (NGOs). According to the 1988 report on Humanitarian Aid in Kampuchea, these organizations worked in most provinces, and in almost all sectors of the health service delivery system. Detailed figures are not given, but it would seem that something in the region of US$10 million worth of aid was provided in 1988 to the health delivery system. According to the report, out of slightly more than 100 western personnel in Kampuchea, about 40 – the largest single group – are health professionals. Doctors comprise 17 of these, with a variety of specialties, along with 12 nurses with half a dozen different specialties. The remainder include laboratory technicians, physical therapists, a prosthetist, and sanitation engineers.

It is doubtless due in no small part to this major infusion of material and technical resources that the health system has been able to provide services to the public in the face of the obstacles and problems that confronted the system in 1979. Ministry of Health officials, extremely hard pressed in all areas, have generally been willing to accept the resources offered them.

4. Conclusions

In the formal sense, the health services of Kampuchea have been re-established. The few professionals from former regimes, the concerned and dedicated individuals with little or no training, together with expatriate professionals and concerned lay people have all contributed significantly to the present situation. While this has indeed resurrected a system of health services, the total effect of so many divergent forces on the health care system has also been to create anomalies and contradictions.

For example, official government policy calls for a system that gives priority to public health measures, and directs its curative services to women, children and minority populations in hard to reach parts of the country. However, those who have worked so hard to restore the health delivery system were trained in a hospital-based, curative-oriented system that is more available to people in cities. The present system reflects their orientation, and the new generation of health workers are being taught the same approach.

A third contribution has been made by the various humanitarian organizations which have provided major material and technical assistance to the system. Much of their aid has supported the hospitals and clinics of the health care system. However, by bringing in additional human and material resources, they have also made possible new programs and services, some of which remain largely dependent on external aid and have not been effectively incorporated into the health system financially or philosophically.

In such a setting, clearly there is a need for a more effective integration of policy, structure, training, and outside assistance, even while services continue to be offered to the population. The need for overall planning was repeatedly offered as a matter requiring urgent attention.

No one recommended a reduction in external aid to the health services. Two areas were frequently mentioned as requiring prompt additional assistance, the provision of which would not prejudice the outcome of policy planning and coordination efforts.

The first is the area of staff training. Evidently the living and studying conditions of health worker trainees varies from poor to abysmal. Students are taught about hygiene in settings that lack the most fundamental necessities for hygienic practices such as clean water, sewage and waste disposal, and sanitary kitchens. In addition, the residential requirements, the classroom settings are equally inadequate. There is an extreme shortage of texts and equipment, and often the buildings are far from structurally sound. A number of organizations currently provide aid to one ore more such institutions, but the need is evidently nationwide.

Another repeated comment was that the lack of clean drinking water was a truly nationwide health problem, along with waste disposal. The latter is an especially noticeable problem in cities and towns. A number of agencies are currently very active in providing water to institutions, towns, and villages alike. No one formula can apply to all settings. But the need is nationwide, and a coordinated effort to expand the provision of clean drinking water is generally accepted as one of the most effective public health measures that could be undertaken at this time.

Khmer authorities could greatly benefit from assistance in undertaking a thorough review of the health sector, looking at the overall model of primary health care as well as considering strategies to improve important components of the system, such as training, health education, sanitation, and how to address special problems such as malaria. Directly related to the foregoing is the Ministry's need to develop a planning capacity, strengthen its management structure, and develop its health management resources.

Priorities

The main priorities that emerge from this discussion are as follows:

- to provide assistance in health care planning, so as to ensure that a comprehensive health service is established in Kampuchea of a type that is both appropriate and realistic;

- to extend the work of the various NGOs which are working in the provision of clean drinking water to reach as wide a population as possible;

- to assist in the training of health workers at all levels;

- to plan and implement a programme for the small-scale production of needed drugs.

B. PRIMARY AND SECONDARY EDUCATION

1. Historical Perspective

General public education has a relatively short history in Kampuchea. After independence in 1953, the number of primary and secondary schools in the country grew steadily and increasingly rapidly in the latter half of the 1960s. According to the National Office of Educational Planning, by 1968/69 there were over one million children enrolled in the six years of primary schools and 118,000 in the six years of secondary education, numbers that had nearly doubled in the previous five years. The students were taught by about 25,000 teachers in primary schools, and 5,500 secondary school teachers.

After 1970 the four years of civil war progressively disrupted all systems in the country, beginning with rural areas and moving to the cities. With the victory of the Khmer Rouge, a formal system of classroom education was abandoned. Many of the teachers in primary and secondary schools were killed. Probably less than one-third survived the next four years.

2. The Past 10 Years

a. Restoring the system

In 1979, the new authorities set out to restore the place of education in Kampuchea. This meant not only putting children in schools, but providing the schools with teachers. Teaching began almost immediately, in remaining schools, in makeshift palm thatch classrooms, or even under trees. Because so few experienced teachers had survived, it was necessary to "crash train" a large number of teachers, many of whom had no more than a primary education. Such training necessarily focused on upgrading general knowledge rather than teaching skills or educational methodology. Courses lasted from one week to four months.

According to the official records, some 13,600 teachers taught 824,000 students (87 percent of them enrolled in grade 1) during the school year 1979/80. By the next year, more than 30,000 teachers - well above the 1969 level - are reported as teaching almost 890,000 students in the four grades that made up the new primary school. For a few years, hardly any students were enrolled in upper secondary school, partly because people with that much education were being called on to teach.

The system of general education currently in place is based on 11 years of instruction: five years of Primary (*premier cycle*, grades 1-5) three years of Lower Secondary (*premier degre du deuxieme cycle*, grades 6-8) and three years of Upper Secondary schooling (*deuxieme degre du deuxieme cycle*, grades 9-11). Some post-secondary education is open to those who complete seven or eight years of school. More advanced study generally depends on completion of grade 11.

Although the central Ministry of Education establishes national education standards, including school curricula, the provinces bear the administrative and financial responsibility for the education system, including school facilities, teachers' salaries, teaching equipment and supplies, and teacher training institutions. In practice, individual communities have assumed responsibility for the construction and equipping of primary schools. Community fundraising includes posting clowns and drums along highways, and stopping passing vehicles to solicit contributions from passengers. The quality of the structures thus built reflected the state of the economy of the local community, and the degree to which education is a local priority. Secondary schools, serving a wider community, appear to benefit from provincial funds and are often in better condition than primary schools.

Teacher training is also largely a province function. Primary and lower secondary school teachers receive their training in the provinces. Between 1979 and 1983 some 36,000 teachers were trained or re-trained for primary level instruction in the "crash training" system, as well as 6,378 teachers trained for lower secondary instruction, and 463 for upper secondary schooling.

As of 1983 primary school teachers were required to have one year of training following completion of grade 8. There are 21 primary school teacher training centres in the provinces, generally housed in extremely derelict structures or remnants of structures. Currently, lower secondary teachers receive three years of training after grade 8, in six regional teacher training centres (Phnom Penh, Kandal, Takeo, Prey Veng, Kompong Cham, and Battambang). Upper secondary teachers receive four years of teacher training following completion of grade 11 at the *Ecole Normal* in Phnom Penh (now part of the University of Phnom Penh). Teacher trainers and education administrators also receive four years of training at the *Ecole Superieure des Cadres de Gestion de l'Education* in Phnom Penh.

In 1987-88, this network of teacher training centres trained a total of 1,700 new primary school teachers (200 less than the year before), 2,200 lower secondary teachers (1,700 less than the previous year) and 250 upper secondary teachers (the same as 1986/87). About the same number of teachers received short term in-service training or "*recyclage*" in various subjects. Some 3,500 primary teachers will receive training in health, hygiene, and nutrition as part of the current revision of the primary school curriculum.

Tables V.B.1-3 summarize the statistics of the number of children in each class during the past 10 years, and the number of teachers. Table 1 indicates the overall enrolment of students in schools for each year, and compares these with the figures for 1968/69. Table 2 rearranges those figures to make it easier to follow the progress of each group of students through the system, expressed as percentages of the numbers who started out together in grade 1 (or a higher grade for those who began at a higher level in 1979/80). Table 3 gives numbers of staff and facilities.

The sheer number of students who have been in the school system at one time or another is huge. Some 5.65 million children in all were recorded as entering grade 1 during the last 10 years. Since that would mean that two thirds of the entire population of the country attended first grade in this period, the figure must be treated with caution. For example, this total counts twice those who stayed behind a year or more, a group which might make up 30 percent of a class. Since almost no children had been in school in the late 1970s, students in grade 1 in the early 1980s were often 10 or even 15 years old, and hence would be in their 20s now. Still, the figures remain very large.

Of those who entered grade 1, about 56 percent continued on to second grade. About 40 percent of those who started out were enrolled in the third grade. And about 32 percent of those who started out in grade 1 actually arrived in the fourth grade. This compares with about 45 percent who made similar progress in the late 1960s.

Looking at the percentage of any given class that continued on to the next grade, there is a pattern observable over the years. Approximately 50 percent of those who entered school in the years 1979 to 1982 continued on to the second grade. From 1983 to 1985 the percentage who stayed in school rose sharply, first to 75 percent and then up to 96 percent. The following years, 1986 and 1987, the percentage who stayed in school dropped again, to around 66 percent.

A comparison between the percentage who stayed on in schools and the numbers of children enrolled in school suggests an explanation. Each year from 1979 to 1982 enrolment in grade 1 alone was around 800,000, an extremely high figure, and possibly not entirely reliable. For these four years, the retention rate to second grade was only about 50 percent. From 1983 to 1985, enrolment in grade 1 dropped sharply, first to 400,000 and then to less than 300,000 as the system caught up with the backlog of children who had missed the chance to go to school in the later 1970s. For these three years, retention rose to a record high of 96 percent. From 1986 on, the numbers of children entering school increased again as a "baby boom" began to make itself felt. Enrolment in grade 1 rose to 400,000 and then to 500,000 while the percentage continuing to second grade declined to around 66 percent.

According to the UNICEF report, about 45 percent of children in primary school are girls, with the figure lowering to 38 percent in the lower secondary grades. During the 1960s, more than 40 percent of children in grade 1 were girls, a figure which dropped to less than

Table V.B.1

GENERAL EDUCATION ENROLMENT

(a) Primary

School year	Beginner	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Total
1979/80		824,009	90,708	20,150	12,450			947,317
1980/81		886,873	336,842	84,774	19,564			1,328,053
1981/82		832,476	424,147	208,147	74,068			1,538,838
1982/83		782,840	408,886	256,347	149,008			1,597,081
1983/84	247,067	384,153	367,580	281,581	214,458			1,494,839
1984/85	245,053	309,384	287,728	274,346	250,578			1,367,089
1985/86	333,065	272,710	238,508	224,262	246,986	118,400		1,433,931
1986/87		399,983	262,342	218,241	199,138	214,523		1,294,227
1987/88		451,133	269,139	204,062	174,553	180,166		1,279,053
1988/89		506,608	293,016	204,966	158,577	150,522		1,313,689
1968/69		339,528	209,851	150,375	105,352	72,501	56,781	919,456

(b) Lower Secondary

School Year	Class 5	Class 6	Class 7	Class 8	Class 9	Total
1979/80	3,200	1,137	466			4,803
1980/81	11,847	3,882	1,622			11,351
1981/82	24,727	11,092	3,696			39,515
1982/83	51,900	23,923	11,180			87,603
1983/84	74,005	48,808	22,913			145,726
1984/85	110,565	78,870	45,492			234,927
1985/86		101,657	77,717	5,616		184,990
1986/87		120,746	106,442	99,861		327,049
1987/88		113,022	105,792	107,589		326,403
1988/89		96,433	93,280	99,351		289,064
1968/69			23,265	22,003	18,323	63,614

(c) Upper Secondary

School Year	Class 8	Class 9	Class 10	Class 11	Class 12	"Terminal"	Total
1979/80	120	92	69				281
1980/81	296	121	138				555
1981/82	1,204	154	159				1,514
1982/83	2,377	970	146				3,493
1983/84	4,818	1,939	882				7,639
1984/85	5,272	4,058	1,558				10,888
1985/86		4,698	3,706				8,404
1986/87		8,454	5,565	4,780			18,799
1987/88		12,378	8,113	5,685			26,176
1988/89		15,200	11,828	8,097			35,125
1968/69			19,501	6,486	5,404	3,303	35,194

From 1979/80 to 1985/86 the "Primary" level included Classes 1-4 only, with Classes 5-7 part of "Lower Secondary" school and Classes 8-10 comprising "Upper Secondary" school. As of 1986/87 an additional year of schooling was added for a total of 11 years of General Education: Primary (Classes 1-5), Lower Secondary (Classes 6-8), and Upper Secondary Classes 9-11).

In the 1960s primary school included classes 1-6 with an additional 6 years for secondary education (plus one "Terminal" year).

Source: Planning Department, Ministry of Education, 1989.

30 percent by the end of the six years of primary school.

b. Literacy

If these above figures are reliable, at least one significant question is raised by this review, and that is in relation to the literacy rate in the country. Presumably all children who entered the school system have been considered literate by the national planners. However, if functional literacy is achieved after completing three years of primary education, it would seem that well over 2 million children, most of whom may now be described as "youth" are probably not functionally literate. The matter bears some more careful examination.

In 1969 the literacy rate in the country was 41 percent. Presumably the rate declined significantly during the 1970s. In 1979, simultaneous with the programme to restore basic education, the "eradication" of illiteracy was attempted through the establishment of a large scale literacy and adult education campaign.

Using such slogans as *"Les instruits enseignent les illettres, les cultives enseignet les moins cultives"* and *"Apprendre et enseigner, c'est aimer la patrie"*, the literacy campaign mobilized 33,597 volunteer instructors. The instructors (mostly teachers, government workers, and secondary school students) conducted literacy classes for about 6 hours per week, receiving either rice (100-250 kilos per year) or cash (80-120 riels per month) as an incentive. At the end of some 150 hours of instruction (5-6 months), literacy students were expected to become functionally literate - that is, able to read, write, and make simple calculations corresponding to completing grade 1 of the regular education system.

Table V.B.2

PROPORTIONS OF STUDENTS ADVANCING FROM
GRADES 1 THROUGH 11 DURING 1979/80 - 1988/89

Year Grade	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89
1	100	100	100	100	100	100	100	100	100	100
2	100	40.9	51.9	49.1	47.0	74.9	77.1	96.2	67.2	65.0
3	100	93.5	35.3	32.0	33.8	35.1	58.4	70.5	74.8	51.2
4	100	97.1	81.7	26.6	20.3	30.1	31.6	51.9	63.9	58.1
5	100	95.2	122.7	57.2	9.0	12.5	14.2	27.4	46.9	48.7
6	100	121.3	89.1	118.7	53.8	9.6	11.5	14.5	14.4	25.1
7	100	142.7	115.5	90.0	119.7	50.2	9.4	12.0	12.7	11.9
8	100	63.5	105.9	74.3	38.7	26.2	6.2	12.1	12.1	11.9
9	100	101.0	33.0	85.3	68.6	32.6	23.3	9.3	1.5	1.7
10	100	150.0	132.5	31.3	71.6	48.7	30.0	27.6	8.9	1.4
11	-	-		-		-	-	38.4	28.2	8.9

In principal, each percentage is intended to show the proportion of either 1979/80 entrants to the grade named diagonally above-left or first graders in later years named diagonally above-left, which entered the grade of the horizontal row in the year of the vertical column. For example, 74.3% of those who joined grade 5 upon its establishment in 1979/80 reached grade 8 in 1982/83; and 58.1% of 1985/86 first graders reached grade 4 in 1988/89. Since they are based on actual enrollments for each year including some students who joined the system in grades 2 or higher after 1979/80, the percentages are increased accordingly.

The first literacy campaign (1980-83) claimed to have "liberated" 567,197 people from illiteracy (55 percent of the target population of adults between the ages of 13 and 40). A second campaign (1984-87) was launched to eradicate illiteracy in Kampuchea.

A National Literacy Congress held in early 1988 claimed a 93.22 percent literacy rate (in the population aged 13-40 for women and 13-45 for men), one of the highest in the developing world. However, the rate of literacy was based on attendance at literacy classes rather than any true measure of functional adult literacy and numeracy. There is an urgent need for a serious assessment of the situation, to facilitate planning of further programmes.

Table V.B.3

GENERAL EDUCATION STAFF AND FACILITIES, 1979-89

(a) Teaching Staff

School Year	Primary	Lower Secondary	Upper Secondary	Total
1979/80	13,619	205	20	13,844
1980/81	30,316	671	28	31,015
1981/82	31,884	1,568	65	33,535
1982/83	32,859	3,300	158	36,317
1983/84	33,479	4,494	271	38,244
1984/85	35,878	6,116	468	42,462
1985/86	35,080	7,416	617	43,113
1986/87	36,754	8,967	858	95,801
1987/88	37,292	10,866	1,064	49,222
1988/89	36,930	11,702	1,403	50,035
1968/69	21,313	4,491		26,804

(b) School Facilities

School Year	Primary	Lower Secondary	Upper Secondary	Total
1979/80	4,000	14	1	4,015
1980/81	4,000	62	2	4,064
1981/82	3,521	96	5	3,622
1982/83	3,114	173	7	3,294
1983/84	3,005	200	13	3,218
1984/85	3,113	222	19	3,374
1985/86	4,294	278	28	4,600
1986/87	4,282	304	33	4,619
1987/88	4,780	337	40	5,157
1988/89	4,730	373	49	5,152
1968/69	5,857	179		5,026

Source: Planning Department, Ministry of Education, 1989.

c. Complementary education

In order to sustain the outcome of literacy campaigns the Kampuchean authorities are now emphasizing complementary education or educational upgrading. The current campaign of complementary instruction has the objective of upgrading the level of instruction of all cadres, government personnel and workers; to persuade newly literate people to continue studies so as to maintain their literacy; and to encourage remaining illiterates aged 13-35 to go to literacy classes.

Through complementary education the education of all adults is to be upgraded to a level equivalent to the first year of primary school. All government workers and half of all solidarity group leaders are to achieve the equivalent of three years of schooling by 1990.

d. Pre-school training

Early childhood education in Kampuchea is generally oriented more toward support of female workers' needs than to children's development. There are some 75-80 creches, 60 of which are in Phnom Penh, caring for children aged 2-36 months. These are under the Ministry of Health rather than the Ministry of Education.

In mid-1989 there were 650 pre-schools in Kampuchea, mostly in urban centres. Such pre-schools serve about 3 percent of the total 3-6 year old population, or approximately 60,000 children. Government funds cover the salaries of staff and the cost of training them, plus materials and food. Factories and parents bear responsibilities for classroom facilities and recurrent costs.

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3. External Assistance

During the last 10 years, the Education Ministry has received assistance most notably from UNICEF, and also from half a dozen non-governmental organizations. A great deal of early assistance went into school construction, and providing basic school supplies. More recently, aid has been directed to the regional teacher training centres, and towards publishing school materials as well as continuing help for primary schools.

The most obvious areas of need continue to be in building and equipping schools. Residential schools i.e. the teacher training centres, for the most part, are perhaps in the greatest need since in addition to classroom space they require dormitories, water supply, sanitation, electric lights, as well as teaching materials. It is also worth nothing that the current pattern of UNICEF and NGO aid focuses on the more populous and accessible provinces, so that there are virtually no programs of assistance to the provinces expecting to receive the largest numbers of returnees from the border, namely, Battambang, Siem Reap, Oddar Meanchey, and Pursat.

Like all other sectors of the society, the first need in education was for the production of services as fast as possible. With the overall system of general education in place, planning for the future has become critical. An issue which needs to be addressed concerns the aim or direction of the overall system. Initial thinking in this area has produced some changes. School children now receive some instruction in health education and school gardening. More attention needs to be given to the educational needs of those who will not continue on in school. And the review of primary and secondary education will also need to fit into the assessment of post-secondary education and technical training institutions.

4. Analysis and Conclusions

The Kampuchean educational system has been rapidly re-established, based on the policy of providing universal basic education to all. Such rapid expansion, however, has been achieved with some compromise in educational quality and relevance. Having re-established an educational system that addresses both the strong desire of the people for education for their children, and the country's immediate need for teaching personnel, the educational authorities now face an equally daunting challenge in improving the quality and relevance of the education system.

Pre-service and in-service training for teachers has contributed to a gradual strengthening of pedagogical skills. Curriculum development promises to make education more relevant. Educational efficiency should result. The establishment of a School of Educational Planning and Management (*Ecole de Recyclage des Cadres de Planification et de Gestion de l'Education*) will assist education officials in managing the country's education programmes.

In spite of all these efforts, significant problems remain. Perhaps most important is to define the kind of education that will be appropriate for the Kampuchea of the future, and to decide upon a time-frame within which an appropriate educational system should be introduced. An emphasis on learning for the world of work is appropriate to the country's needs, but to date the education system has had difficulty in addressing what knowledge or what training is relevant to prepare children for adult life in an agrarian society.

In addition to these large philosophical and social questions are other problems of educational management or administration. Many such problems relate to limitations imposed by resources constraints. Although by no means limited to the educational sector, teachers salaries are insufficient to support even a minimum standard of living.

Priorities

Until recently, the Ministry of Education could print only some 100,000-150,000 textbooks per year, whereas the requirement for school textbooks exceeds 2 million a year. In addition to the Ministry of Education's own printing capacity, several hundred thousand textbooks have been printed each year in other Kampuchean printing units or in Ho Chi Minh City. Even with the Ministry's expanded capacity of some 600,000 books a year, only one student in four will have access to a textbook in each subject.

There also remains the problem of the quality of educational facilities. Many educational institutions have little or no teaching equipment, and many lack any water or sanitation facilities. They often lack windows and doors and need repairs because of leaking roofs and earthen floors. Such deficiencies compromise the learning environment and severely limit the capacity of the system to convey hygiene and health information effectively.

While policy is being determined, major assistance is needed to improve the physical structures of schools at all levels, to provide drinking water and sanitation, and to equip them with classroom teaching aides. These needs are particularly acute in teacher training institutions. Finally, the country's capacity to print textbooks must expand fourfold before it can begin to meet the basic needs of students.

C. TERTIARY AND TECHNICAL TRAINING

1. Historical Perspective

a. Before 1970

Higher education in the Cambodia of the 1960s was limited, but growing rapidly. Instruction was entirely in French, and generally based on French curricula and pedagogy. Higher education generally meant four years of training following the completion of secondary school (12 years of schooling plus one "terminal" year).

Until 1965, the only institution of higher education in the country was the Royal University. After 1965 other technical or regional Royal Universities were added until by 1969 there were nine universities with 34 faculties and eight "*grandes ecoles*". Graduate studies were pursued abroad, generally in France.

The Royal University had seven faculties or schools, Law and Economics, Arts and Humanities, Science, Medicine and Paramedical Sciences, Pharmacy, Commercial Science, and Pedagogy. A total of 6,971 students were enrolled in 1968/69, 16 percent of them women.

The Royal Technical University was founded in 1964. It included five schools and one institute. The schools offered Civil Engineering, Electronics, Arts and Crafts, Applied Chemistry, and Civil Aeronautics. The institute was the Higher Technical Institute of Cambodian-Soviet Friendship (*Institut Technique Superiur de l'Amitie Khmero-Sovietique*) and included schools of Construction, Mining, Agricultural Irrigation, Electricity, and Textiles. In 1968/69, the Technical University enrolled 1568 students, 7 percent of them women.

Two more universities were founded in 1965, the University of Fine Arts, and the first of several provincial universities, the Royal University of Kompong Cham.

The University of Fine Arts came to include schools of Choreography, Music, and Plastic Arts, and also Archeology, and Architecture and City Planning. There were 787 students enrolled in 1968/69, 25 percent of them women.

The Royal University of Kompong Cham included schools of Tropical Agriculture, Mechanical Engineering, and Physical Science and Mathematics. There were 690 students in 1968/69, 12 percent women.

The other two provincial universities were in Battambang (founded 1966) and Takeo/Kampot (founded 1967). Battambang included schools of Applied Geology and Mining, Food Industries, and Mechanical Construction. Takeo/Kampot offered schools of Electricity, Mechanical Engineering, Oceanography, and a school of Medicine. In 1968/69 there were 383 students in Battambang (9 percent women), and 144 in Takeo/Kampot (3 percent women).

The Royal University of Agronomic Science was established in 1965. In 1968/69 there were 131 students, three of them women. It included schools of Forestry, Agricultural Science, Fisheries, Veterinary Science, and Civil Engineering.

In addition, an agricultural "*lycee*" was established at Prek Leap near Phnom Penh, offering a 3-year course in a similar array of subjects, leading to a position as "controller" in the province administrations.

The final two universities were the Buddhist University (127 men only) founded in 1965 and the "Popular" University which was founded in 1966 as a university. It included a Centre for the Training of Technicians and for Productivity Increase, and a Vocational School. The latter was established in the 1920s and incorporated in the Popular University. This University was charged with overseeing private technical education in such areas as Radio-Electricity, Accounting, Typing, and Cutting and Sewing. The Popular University had 334 students in 1968/69, 38 percent of them women.

Unrecorded here are the training units within Industries or Ministries oriented towards providing people to operate, maintain and repair the equipment used by the factory or Ministry.

b. The experience of the 1970s

Information was not available at the time of writing about the development of the above mentioned institutions during the civil war years of 1970-75. It is likely that most of them would have continued in operation. Some might have grown significantly before the events of 1975 brought them all to an end. Students and faculty alike began to move abroad as the military situation in the country deteriorated but a large portion of the small group of educated Khmers stayed behind. However, by 1979 the number of fully qualified professionals who remained alive in Kampuchea ranged from zero in law and veterinary medicine, to 10 percent in human medicine, and an estimated 20 percent in education. The only initiative which was undertaken during these years was the establishment of a technical school in Phnom Penh, enrolling 300 students in what was to have been a 7-10 year program of training of full-fledged engineers.

2. The 1980s

a. The inherited situation

Many of the surviving educated Khmers eventually took up positions in the government, which was essentially the only employer available. They faced huge responsibilities, virtually no resources (there was no money in circulation for more than a year), and lacked any significant human or material support system to help with the task.

Truly massive international aid was critical to the survival of the people in the first two years. Significant technical assistance from Viet Nam and the Soviet Union helped to get government departments and industries going again. UN and western NGO aid helped restore to partial functioning the smaller industries, health and education services, and even the Phnom Penh water supply. Significantly, the management of most of these systems remained in the hands of Khmers, even when there were many foreign technical assistance personnel present.

The survivors from the former regimes found themselves faced with the triple task of (1) doing what their training had equipped them to do e.g. surgery, (2) administering major units of government e.g. serving as Vice Minister of Health or the director of a hospital, and (3)

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instructing the next generation of people in their field e.g. teaching at the medical school. For most of them, this triple burden remains a fact of life.

b. Higher education structure

Higher education is again being offered in many of the fields in which it was available in the 1960s. The following listing records present institutions of higher education and the fields of study they offer, and makes some comparison with those existing in 1968/69.

(1) Phnom Penh University (formerly the Royal University) with 6,971 students:
- *Ecole des Langues* (formerly part of Art and Humanities);
- *Ecole Normale Superieure* (training for teaching in upper secondary school, formerly part of the School of Pedagogie in the Royal University).

(2) *Ecole Superieure de Recyclage des Cadres de Planification de l'Education* (formerly in the School of Pedagogie, Royal University):
- Teacher training
- Educational Administration

(3) Medical School (from the Medical Faculty of the Royal University) about 2,000 students now:
- Doctors – 7 years
- Dentists – 7 years
- Pharmacists – 6 years
- Medical assistants – 4 years
- Secondary pharmacists – 4 years
- Auxiliary dentists – 4 years

The *Ecole des Cadres Sanitaire*, offering 3 years of training, appears to be a downgraded version of the "Paramedical Science" portion of the Medical School in the Royal University. It offers training to:
- State nurses
- State midwives
- Pediatric nurses
- Physical therapists
- Laboratory technicians

(4) Institute of Economics:
- Commerce (formerly in the Faculty of Commerce, Royal University);
- Finance;
- Agricultural Economics;
- Industrial Economics.

(5) National School for Administration and Law, as of 1987 began to offer:
- Legal studies (2-year course).

(6) *Institut Technique Superieure de l'Amitie Kampuchea-Sovietique* (part of old Royal Technical University), now 1,200 students in the Technical Institute versus 1,658 in the Technical University. Courses are offered in:
- Construction
- Electrical Engineering
- Agricultural Hydrology
- Mining and Geology

(7) School of Fine Arts (formerly 787 students):
- Choreography
- Music
- Plastic Arts

(8) Agricultural Institute (old University of Agronomic Science) at Chamcar Daung, now 531 students, versus 131 in 1968/69:
- Agronomy;
- Forestry;
- Fisheries;
- Veterinary Medicine
- Agricultural Mechanization (new)

Strong attempts have been made to restore as many elements as possible of the previous system without perhaps always giving enough thought to the appropriateness of doing so. Health, education, agriculture and fine arts appear most completely restored as fields of study. Offerings in the sciences are severely limited now. There appears to be a complete absence of full-fledged training for civil engineers at a time when construction is urgent in many sectors of the society. Within the context of an overall assessment of the nation's higher education needs, it would seem worth giving particular attention to training for civil engineers.

The particular institutions and/or courses which have been lost are as follows:

- University of Kompong Cham, which had 690 students and offered:
  - Tropical Agriculture;
  - Mechanical Engineering;
  - Physical Sciences and Mathematics.

- University of Battambang, which had 343 students and offered:
  - Applied Geology and Mining;
  - Food Industries;
  - Mechanical Construction.

- University of Takeo/Kampot, which had 144 students and offered:
  - Electricity;
  - Mechanical Engineering;
  - Oceanography;
  - Medicine.

- From the old Royal University faculties:
  - Law and Economics;
  - Art and Humanities;
  - Science.

- From the Technical Institute:
  - Textiles;
  - Electricity.

- From the Royal Technical University
  - Civil Engineering;
  - Electronics;
  - Arts and Crafts;
  - Applied Chemistry;
  - Civil Aeronautics.

- From the School of Fine Arts:
  - Archeology;
  - Architecture.

- From the Agricultural Institute:
  - Civil Engineering.

- From the Popular University (which had 334 students in 1968/69):
  - Centre for Training of Technicians and for Productivity Increase.

(However, its Vocational School has been retained, but downgraded to become the *Centre de Formation Professionelle de l'Amitie Kampucheo-Sovietique*, which offers technical courses in: sheet metal work, machine repair, lathe operation, brick laying, carpentry, auto mechanics, electricity, refrigerator repair, farm tool repair, etc.)

c. Noted deficiencies

Graduates of the current system have serious deficiencies in their training. Frequently noted are:

- Training is theoretical. Little effort is made to relate what is being taught to the situations that graduates will face.

- Training is by rote. Faculty members give lectures, sometimes by reading a text. Students record and memorize the material.

- Laboratories are rarely available or usable. Field work is seldom built into the course of study

- Training is very patchy, dependent on the memory of those called on to teach, or the chance availability of texts. Major gaps are often evident in the subject matter being taught.

- Instruction is sometimes provided in a foreign language which may or may not be understood well enough by students and requires that the students spend substantial additional time in learning the language.

- Text books, reference books, and journals are generally either very scarce or completely lacking.

- Some subjects do not yet have an agreed upon Khmer vocabulary and therefore no written materials in Khmer. Khmer language materials that do exist are rarely available to students in sufficient quantity.

d. Technical training structure

Technical training is offered on many levels, from a few days of orientation/training to a volunteer, to several years of study after secondary education. This section will dwell more on post-secondary education.

Health (more detail is provided in Chapter IV.A above). In addition to the Medical School and *Ecole des Cadres Sanitaire* noted above:

- Hospital-based training programs in 17 province hospitals, providing one year of training for primary school graduates. Graduates become primary nurses and primary nurse midwives. Instruction is provided by hospital staff, including doctors, medical assistants, second level nurses and midwives. Limited Khmer language material is available. The book "Where There Is No Doctor" has been translated into Khmer.

- A 5-day course is provided to village level volunteer health workers who help organize immunization campaigns, public health education, and help refer villagers to district clinics.

Education (more detail is provided in Chapter V.B above). In addition to the *Ecole Superieure de Recyclage des Cadres de Planification de l'Education*, and the *Ecole Normale Superieure* mentioned above, the system includes:

- Regional Teacher Training – in six centres, providing three years of training to graduates from upper secondary school. Graduates of this training become teachers in lower secondary schools.

- Provincial Teacher Training – in 21 provinces, providing one year of training to graduates of lower secondary school, who become teachers in primary schools.

Agriculture (more detail is provided in Chapters II.B-E above). In addition to training provided at the Agricultural Institute at Chamcar Daung, noted above, training is provided by:

- Prek Leap Agricultural Technical School, which was originally founded in 1951 and reopened in 1985. Most faculty are part-time, with primary responsibility as staff in the Ministry of Agriculture. Instruction is offered in:

  - Agronomy;
  - Veterinary Service/Animal Husbandry;
  - Forestry;
  - Fisheries;
  - Rural Economy;
  - Hydrology.

The school offers 2-1/2 years of instruction to 190 graduates from 8th grade who will become "controllers" in province offices. About 80 students who have finished 7th grade are enrolled in a 1-year course of study to become "agents".

- Kampong/Ampil provincial agricultural school in Takeo was established in 1986. It draws in part on Ministry of Agriculture staff in Phnom Penh, which is logistically very difficult to arrange. Province staff also provide instruction. Courses of study include:

  - Hydrology;
  - Agronomy;
  - Veterinary Service/Animal Husbandry (new this year).

A 1-year course of training qualifies graduates as "agents". About 200 are reportedly enrolled.

- Kampot provincial agricultural school was established in 1987. It offers "agent" level instruction in:

  - Agronomy;
  - Hydrology (to be added);
  - Animal Husbandry (to be added).

- Stung Treng provincial agricultural school: training is planned or may be under way.

e. Training within Ministries

In addition to the Soviet-Khmer Friendship Institutions mentioned above (the Higher Technical Institute and the Centre for Professional Training) the Ministry of Industry operates its own training school for Ministry personnel.

Russey Keo Technical Training School in Phnom Penh was re-opened in 1981. Survivors from pre-1975 provide nine months of training to lower secondary school (8th grade) graduates. A maximum of 138 trainees in any one session are taught skills in automotive repair, welding, metal work, wood work, and electrical work.

Kampot Workshop, has only three survivors and very little equipment. The provincial staff is seeking help from the Ministry of Education to provide classes in mechanics, and aid from humanitarian organizations to provide equipment and building repairs so that they can train people to help maintain the fleet of 500 or so fishing boats that operate out of Kampot.

Battambang technical training centre has been assisted by NGOs.

Other Ministries, such as Transport and Communications (see Chapter IV.C above) and the Department of Hydrology in the Agriculture Ministry, have internal training programs of their own, supplying staff for the workshops within their jurisdiction.

f. Problems in technical training

Despite the progress made in re-establishing a system of technical education, a number of limitations are evident in each aspect of the system.

Faculty are drawn largely from the ranks of survivors from pre-war days who must also administer government departments and/or supervise project implementation. They are rarely trained to teach. They have few professional colleagues to call on for advice, and little access to information from other countries. In the last few years, graduates from the system have become available to help teach others. Their own training has the serious limitations noted earlier. Perhaps substantial numbers are returning from post-secondary studies abroad, at least some of them with professional qualifications. There may be problems relating both the language and content of that training to the situation in Kampuchea.

The wages of all government employees in Kampuchea today are such that it is virtually impossible to live on that income alone. Very frequently, one member of the family of a government employee will work in the market place. Many government workers take on additional jobs privately in order to earn enough to live on. All faculty members face this problem.

Teaching materials and curriculum development both show serious deficiencies. Those who teach generally are not trained to do so, and feel the need of assistance in drawing up effective curricula in their field. Very few materials are available in Khmer, but few students or trainees know a second language well enough to make use of non-Khmer materials. Translating foreign language materials or preparing materials in Khmer would normally fall to those who teach. However, teachers have little time away from their regular work to plan a course, and even less to prepare translations.

The effectiveness of expatriates as teachers has been severely limited by the lack of translators, or the need for student to learn the language of the teachers. Expatriates also bring with them their own approach to pedagogy which may or may not be consistent with that offered by Khmer or other expatriate teachers.

Although there has been a decision to teach all courses in Khmer within a few years, some, perhaps most, institutions expect to have to use a second language for access to needed information. Each institution seems to be making its own decision as to which language to choose. A critical question is the lack of agreed upon Khmer vocabulary in each area of study. To date, the process of reaching an agreement on new vocabulary has been extremely slow, involving staff from two or more ministries.

Equipment seems to be a little better in workshops than in formal training settings. Province training establishments appear to be almost devoid of usable equipment.

Living conditions of trainees are often unsanitary or even unsafe. Ministerial funds are so meagre that students can have difficulty maintaining adequate nourishment while studying.

3. Some Conclusions

Those who saw conditions in Kampuchea in 1979 can appreciate fully the accomplishment represented by the presence of so many educational and training institutions in the country today. Initially, so much work needed to be done simultaneously that there was little risk of duplication, and often not even a problem if different systems of instruction developed. However, there are enough institutions now that internal contradictions have begun to emerge, and lack of coordination has begun to cause problems among existing development efforts. A political settlement is likely to lead to substantial new external assistance projects, putting an even greater strain on the system to provide people with appropriate technical and professional education. Technical assistance is needed to help plan how best to strengthen higher education and post secondary training institutions to support development efforts.

Virtually everyone in Kampuchea today is called upon to work beyond the level of his or her training. Substantial new external assistance will make an even heavier demand on people who are already overextended. Planners and administrators, teachers and project managers, mid level and even basic level technical staff will all need support and assistance in order to cope with their additional responsibilities. Such help could range from providing Khmer with reference materials in languages they can understand to brief intensive workshops or training sessions. The use of aid projects as a means of improving the skills of those still undergoing formal training, either as field placements or supplementary training should be considered.

All training programs are seriously under-equipped. Many are ill-housed. None have adequate instructional materials. Given the decision to provide in the near future instruction in all courses at all levels in the Khmer language, a major effort is necessary to help create and then make available Khmer language materials.

Long-term study abroad by Khmers to obtain full professional qualifications so far appears to have produced limited benefits. Reportedly, those who go abroad are chosen by the Ministry of Education. On their return, graduates receive assignments from the Ministry of Plan. This limits the capacity of a ministry to fill its personnel needs through this channel. However, study abroad in order to obtain professional qualifications remains an essential component for longer term development in Kampuchea.

Short-term study abroad appears to have been beneficial in two circumstances. First, short study tours for present administrators-cum-teachers has often been productive. New ideas, new contacts, and access to new information are frequent benefits of such trips. Second, the training of recent graduates can be significantly enhanced by short-term (less than one year) study abroad, even if it is essential for the graduates to study the relevant foreign language intensively for several months before traveling abroad. Care must be taken to identify appropriate institutions which will provide tailor made instruction for such trainees. The International Rice Research Institute in the Philippines has provided one such location. The International Centre for Maize and Wheat Improvement in Mexico has been suggested as another.

The question of inadequate income for all government workers poses serious difficulties which cannot be solved in the context of higher education alone. It is a factor which must be taken into account in all development assistance plans.

A high priority for external assistance would be to provide help with planning. The questions that urgently need attention range from possible gaps in the present system (such as an absence of training for civil engineers), to the development of Khmer language materials in each subject, to the need to strengthen as quickly as possible the effectiveness of teachers and trainers, to how to make use of existing aid projects as training grounds for future aid projects. Also important will be an assessment of the needs of the higher education system for material assistance, ranging from dormitories and kitchens to laboratories and classroom equipment. This material aid can begin without waiting for the results of the planning discussions.

D. VULNERABLE GROUPS

1. Introduction

During the period between 1970 and 1979, the Kampuchean people were subjected to a series of calamities. Warfare, starvation and massacre exacted a toll in terms of human lives lost, and left many people destitute, orphaned, widowed or disabled. The care of these people must rate high in any system of priorities, not simply on humanitarian grounds, but also because they represent a valuable human resource which, at a time when there are comparatively fewer able-bodied men in the population than would normally be the case, is much needed. In terms of pure numbers, single and widowed women comprise the most important of these groups, and they are discussed first.

2. Women in society

a. Traditional lifestyle: a historical perspective

Before 1970, as now, the great majority of Khmer women lived in villages as members of rice farming communities. Extended families were common, with several generations living in the same household. Other relatives lived nearby. Social security was provided by the extended family network.

Daily tasks around the house, while not evenly distributed between men and women, were generally shared. Child care, fetching water, gathering firewood and husking rice while seen as primarily the women's responsibility were all shared by men, by older children (more often girls than boys) and older members of the extended family. Cooking appears to have been almost exclusively the woman's task. Men did the house repairs.

Farm work was also divided. Women did the backbreaking work of transplanting and harvesting the rice. Men worked with draft animals to do the heavier work of ploughing and harrowing. Women generally took care of the animals afterwards, however, and also tended the family garden.

Older women contributed to the family economy to the extent that they were able. Often this was by providing child care while parents worked in the fields or helping with the cooking and housework. Their own security rested on the expectation of support by the younger generation.

Their roles as wives and mothers dominated the lives of women, although not quite as much as in some other societies. The average age of marriage in the early 1970s, according to one study, was 18.6 years, considerably later than in many developing societies, with the first pregnancy at 19.9 years. According to the same study, the average number of births was 5.6, with 4.6 living children per woman.

Women in Kampuchea have also traditionally played a major role in the market place. They made many of the items for sale, such as cloth, baskets, and pottery. Women were generally the vendors as well. This traditional commercial role, with the management of money that it involved, may have been significantly underestimated in earlier assessments of women's role in the economy.

After independence a more "modern" society began to emerge in the towns. The role of women in the new society slowly developed over the years. Girls were sent to primary school in growing proportions during the 1960s. In 1964, 32 percent of the children entering first grade were girls, evidently a much higher portion than had been true a few years earlier. By 1968, the proportion had grown to 45 percent. Only about 40 percent of all children entering first grade finished the full six years of primary school, but the proportion of girls who stayed on seems to have been about the same as for boys.

The higher grades in the school system reflected a greater disparity between the sexes than existed when the students entered first grade. In 1968 only 3 percent of the students in technical schools were women. The School of Fine Arts, on the other hand, included 28 percent women, and the Royal University, 16 percent.

b. Women during the 1975-78 period

During these years, women and men were to a large extent both reduced to units of farm labor. In many parts of the country, normal family life was abandoned. Food was prepared in common kitchens. While small children generally lived with their parents, they were usually put to work on traditional farm tasks such as tending the animals at an early age. Sometimes they were separated from their parents into youth work brigades.

During this time, marriages were often arranged by and at the convenience of the state. Couples did not always live together. No firm statistics appear to be available, but the birth rate is generally reported as dropping sharply. Vulnerable populations, including small children, suffered from a high mortality rate. The roles of wife, mother, and home maker dwindled in significance during these years.

Daily work for women and men was established by the state, and focused almost entirely on growing rice, clearing forests, or participating in construction projects such as digging canals. Making handicrafts or growing supplementary food was prohibited and even punished. There was no money in circulation and no bartering of goods allowed.

The events of the 1970s took a very heavy toll in the lives of all Khmers, but especially depleted the numbers of young men. Under the Khmer Rouge, adults all did the same work, effectively concealing the impact of this imbalance between men and women until more traditional, differentiated work patterns began to be restored in 1979.

c. Women in the 1980s

By and large, women in Kampuchea in the 1980s have returned to their pre-war patterns of activity. In the countryside, they transplant and harvest the rice, do the cooking and tend children. In towns and cities they dominate the stalls in the market place, do the cooking and tend children. But their work load is much heavier than before for several reasons.

The primary reason is that there are significantly fewer able-bodied men in the population than before, and this will be considered later. But in addition, the events of the 1970s had wiped out the small accumulations of tools, household supplies, equipment that had provided a margin of security or comfort. The number of draft animals was also reduced to about 50 percent of the pre-war situation. Human power had to make up some of the difference, while other work simply was not done.

The homes of villagers had often been destroyed, sometimes more than once, forcing everyone to build new shelters just to get started. At a time when there was much more work to do, there was much less to do it with, and much more of the work fell to women to carry out.

The extra burden on women in the 1980s included bearing more children than before. The birth rate rose dramatically. However, the support system for childbirth, both social and medical, was severely reduced. Few midwives, traditional or modern, were available to help with deliveries. Women relatives in the extended family system who might have helped with everything from cooking to child care to the actual delivery were often dead or scattered. In the first years especially, infant mortality was very high.

The 1985 Constitution formally established equality between the sexes in Kampuchea. Women, it decreed, should participate fully in the political, economic, cultural, social and family life of the country on equal terms with men. Women were also supposed to receive particular attention and support from the health care system. Given the conditions of life in Kampuchea at the time, these statements reflected goals rather than accomplishments.

As mentioned in the section of this report dealing with education, primary school enrolment in 1988 reportedly included 45 percent girls; lower secondary grades included 38 percent girls. The portion of women in higher education reflects both pre-war disparities and current efforts to remedy them. While 25 percent of the students in medical school are women, only 15 percent of the doctors and medical assistants, and even smaller percentages of the pharmacists and dentists are women. Exact figures are not available on the numbers of trainees who have gone abroad for higher education. However, women seem well represented among the thousands who have studied abroad. It is reported that 31 percent of the country's 2,558 university graduates are women.

Other available figures on women in Kampuchea indicate that some 30,000 women work in state institutions, most of whom would be teachers and nurses. Women are also active in some industries, comprising 60 percent of textile workers, 70 percent of those making salt, and 50 percent of those engaged in rubber production. They are rarely in senior positions. A high portion of vendors in the market places are women.

The People's Revolutionary Party of Kampuchea (PRPK) includes few women. Only 5 percent of the party members are women. However, of the 145 members of the National Assembly, 21 are women and 5 are in the 31 member Party Central Committee. Women, it seems, are significantly better represented among the leadership of the Party than among the membership. Seven women hold Ministerial level positions.

As mentioned, the most striking fact about the position of women in Kampuchea today is that they have to shoulder a much larger share of the total work load of the society than before because so many young men died in the 1970s. The overall statistics on men and women in the population are reviewed in the section of this report dealing with population. Between 53 and 54 percent of the total population are women. The proportion of adult women to men is more like 58 percent to 42 percent. Nationwide statistics are not available, but in one district where the overall proportion of females was about 53 percent i.e. seemingly average, women comprised 62 percent of the "able bodied" population (between 18 and 50 years of age) and fully two thirds (66 percent) of those aged 18 to 30. While this imbalance means that some women will never get married, the disparity is most clearly evident in the numbers of married women who have become widows.

3. Widows

a. The dimensions of the problem

Nationwide figures on the number of widows in Kampuchea are not available. However, in Prey Veng province in 1988 the total population was given as 776,255. There were 411,407 women, or about 53 percent, which is close to the national average. However, in that population there were 46,826 widows, about 6 percent of the total population. A study carried out by Chantou Boua and Ben Kiernan in some villages in the province indicates that almost all widows are heads of households. While the average rural family may include five or six people, they report that widows' families are only "slightly" smaller. Taking that to mean that each widow is head of a family of at least four persons, then widows are the primary support for more than 187,000 people, or 24 percent of the population of the province.

The people of Prey Veng suffered particularly severely during the 1970s, so the portion of widows may be higher there than elsewhere. Even so, this suggests very strongly that 20 percent of the rural population, or approximately 1.4 million people in rural areas nationwide are dependent on widows for their daily living. The portion of urban families headed by widows may differ from that in the countryside. However, whatever their numbers are, they would only add to this figure.

There has been no study specifically on the implications of living in a widow headed household. However, the Boua and Kiernan studies give some helpful information. Their reports suggest that the nutritional level of people in such households is poorer than average, contributing to a greater susceptibility to disease. When widows were asked what they needed, most frequent mention was made of a corrugated tin roof i.e. one that did not leak. Cloth for clothing was next, followed by basic household items like cooking pots and mosquito nets.

What widows lack most of all, however, seems to be time. Tasks that would have been shared with husbands fall entirely on widows and their children. Since most of the children of widows are now in their teens they can contribute to the family work force, and do not demand child care. Still, the heavier farm work of plowing and harrowing must be "borrowed" from a man with draught animals, and then repaid with twice as many hours of work. Other farm tasks that are usually shared with men and are particularly time consuming include carrying water to drink, milling rice by hand, walking the treadle pump (*rohat*) to irrigate fields, and participating in community labor projects.

Since "borrowing" labor from others reflects both traditional and recent village patterns of work, it is worth nothing in some detail how village labor has been organized in Kampuchea for the last ten years, and how that organization is changing.

b. The future of widow headed households

If widows are considered only as individuals, representing about 6 percent of the population, it is possible to think in terms of helping them by special training programs and the like. However, when considered as heads of households, their economic condition has a direct bearing on 20 to 25 percent of the total population, involving numbers that are hard to address one by one.

Rice production in Kampuchea today is less than that of the 1960s largely because there is about 20 percent less land under cultivation now. A common response to the plight of widows is to try to provide them with non-farm skills, such as making clothes or other items for sale, in effect, taking them out of the farm economy in favor of more urban activity. Wholesale removal of so many families from farming would seem inappropriate at this time. The challenge is to try to develop ways that would keep the families on the farm by making it economically feasible for them to do so. It would seem important for authorities and external aid agencies to give early attention to the nationwide situation of widow-headed households. The approach can vary from case by case from minimal assistance to completely comprehensive.

The most comprehensive idea for support for widow-headed households is that of a widow's pension. Given the county's poverty, such a program would have to be externally funded. Since there may be half a million widows in the country, even a modest $50-a-year pension, which might or might not be enough to make the difference between survival and failure, could cost US$25,000,000 a year. Administering such a program would be a major consideration as well as evaluating whether the same money might be better if spent in some other way.

At the other end of the spectrum are programs of aid to individual widows. The Family Food Program, which UNICEF is supporting in cooperation with the Women's Association and provincial authorities, involves individual families, for the most part, but also children in schools. Poor families, often headed by women, are helped to grow additional food or cash crops. An assessment of the cost per beneficiary suggests that initially it may involve several hundred dollars a year per family, but the program is seen as producing an investment that will not need to be repeated after the first few years.

Also in the category of aid to individuals are proposals to provide training and equipment for such non-farm activities as making clothes, or assistance in processing and selling agricultural products, like palm sugar, fish sauce, and various dried foods. "Kits" of household items ranging from tin roofing to mosquito nets for all widows would be another comprehensive program. Free school supplies could be provided to children of widows.

An indirect approach would be to consider programs that might alleviate the widow's need for more time than is available in a day. Tasks mentioned as making a heavy demand on a widow's time include carrying water, milling rice, working the *rohat* pump, working in exchange for labor, e.g. to repay a half day of ploughing with a team of oxen with a whole day of rice transplanting or harvesting, or working on community projects.

Clearly no one program can deal with all of these demands. Village drinking water programs take on increased urgency and benefit when seen as contributing to the economic viability of widow's families as well as to general health and welfare. Programmes providing villages with power operated rice mills and irrigation pumps could take into account how they might best be used to benefit widows. A widow with a draft animal has an additional source of labor to exchange with her neighbors.

However, the demands on a village woman's time made by community projects are such that a closer look at them is warranted.

c. Conclusions

The reconstruction tasks of the country impose heavy work loads on the entire population. Largely as a result of the serious shortage of young, adult, able-bodied men, women must do a large share of the work. It is particularly widows who carry this extra burden. About 20 percent of the entire population may be dependent on widows for their daily sustenance.

Serious attention needs to be given as to how this situation may be addressed, both as a problem of its own, and also as an aspect of virtually all aid projects. Simultaneous approaches can be made to provide assistance to individuals, communities, and to the whole country. The matter can be addressed directly, through material aid to widows, or indirectly, through projects that reduce demands on their time, or provide greater rewards for the time they spend.

One suggestion that has been put forward is that a project should be mounted with an overall budget of perhaps US$2-3 million, implemented by appropriate NGOs, which would be designed to provide immediate relief to selected groups of disadvantaged women. This would necessarily be experimental in nature, and aim to distribute tools, draft animals, roofing, or other material assistance. If successful, such a project could be replicated.

4. Other Vulnerable Populations

Vulnerable populations in Kampuchea include orphans and unsupported elderly, amputees and people with other physical disabilities, and people with mental or emotional problems.

By and large, the way of caring for vulnerable populations in traditional Khmer society was through the extended family. There were few institutions or special services available to provide help. Families coped as well as they could with members who were physically or mentally disabled or too young or old to care for themselves. The sense of responsibility included a network of relatives who supported each other in a variety of ways ranging from sharing farm labor to caring for children or disabled people.

a. Orphans

There is no tradition of orphanages in Kampuchea. The extended family system generally provided for children who were left without parents for one reason or another. The deaths of so many people in the late 1970s created a great number of orphans. It also disrupted the extended family system which would normally have been the means to care for them. There are reports of deliberate separation of youth and children from their parents to form separate work groups. However, this does not seem to have been a major factor in creating orphans. The relocation during this period of large portions of the populations of Svay Rieng and Prey Veng provinces to Pursat, Battambang, and other provinces in the west, reduced a great many extended families to nuclear family units. Since the receiving provinces were unready and/or unwilling to accept the newcomers, the mortality rate was particularly high in these populations. When parents died, surviving children often had no other family group to take them in. In 1979, when it became possible for people to return to their home villages, the children often could not identify their place of origin clearly enough to allow for them to be reunited with other relatives. As a result, orphanages became a necessity in 1979.

The reliability of available statistics is not clear. Reportedly, there were 200,000 orphans in the country in 1979. The government provided care for 6,000 of them in 34 orphanages around the country. The current figure for orphans is given as 75,000. The Ministry of Social Action reports that in 1988 there were 26 orphanages caring for 3,165 children under 15. Many of the children have grown old enough so that they are no longer counted as orphans.

The number of orphans includes nearly twice as many boys as girls (2,061 to 1,104). One explanation offered was that girls are considered more useful around the house, and hence more likely than boys to be taken into the homes of more distant relatives or unrelated neighbors in order to help with the housework. This raises questions as to whether or not girls who are orphans and who live in private homes have the same chance as other children to go to school. School-aged children in orphanages generally are enrolled in schools.

The great majority of orphans have been taken care of by people in the communities in which they live. Boua and Kiernan in 1986 describe a district in Prey Veng province with about 50,000 people in it as including more than 800 children identified as orphans. Their detailed study of village life in the district makes no further mention of orphans. This suggests that the orphans live as other children do, with families in private homes, attending school, and working without obvious differentiation from other children.

From the beginning, orphanages attracted a certain amount of external interest and support, usually to improve their physical structure or to provide equipment. However, as with other government institutions, very little has been available from the government for operating funds. In general, orphanages - with some notable exceptions - share the problems of other residential institutions of inadequate shelter, poor hygiene, and frequent problems with the food and water supply.

Those who were orphaned in the 1970s are now entering the work force as adults. It sees that the need for special care for orphans may soon be over, at least in the countryside where the extended family is resuming its former role in society. People in the cities may face a different prospect. Observers feel that there may already be many "street children" in Phnom Penh who fend for themselves without family support. The Ministry of Social Action sets the figure at 3,000. However, it is not clear whether such children are entirely on their own or still supported by family life and simply working on their own, running errands, or taking care of themselves while parents work. Phnom Penh authorities report 100 abandoned children in a year coming to their attention. At times this seems to have included situations such as a single parent leaving a child at an orphanage during a time of particular hardship with the hope of reclaiming the child later.

Orphanages comprise one social service that in the short run can reasonably be expected to reduce in numbers and significance. The figures available are encouraging, indicating a nearly 50 percent reduction of children in orphanages during the last 10 years. With growing stability in the country, the extended family can again be expected to provide for children left without parents.

b. The elderly

The traditional form of social security for the aged in Kampuchea was support from the next generations of the family. The 1970s have generated a certain number of orphaned elderly, as it were, people whose age or infirmity makes it hard for them to care for themselves, but who have lost the families who might otherwise have supported them. The group does not seem to be large, at this point. Reference is made by UNICEF to pagodas providing shelter and a locus of activity for older women without families. It is not clear what numbers are involved, and what kind of help they may need. There is no mention of men in such situations.

c. The physically disabled

According to reports, the traditional Khmer attitude towards people with physical disabilities was not positive. If the disability was severe, the assumption was that the person would have to be completely dependent on others for support. The tendency was to keep such people at home, reasonably well cared for, but inactive and completely dependent on others. One report suggests that there was once even a prohibition against the government's hiring of disabled people. This attitude is changing significantly as the number of adult disabled - most notably amputees - has grown dramatically. Since many amputees are former military personnel, there is strong social pressure to give them special credit and support. Government ministries have been instructed to employ at least 5 percent disabled persons. The Ministry of Social Action reports achieving this goal.

Responsibility for services for the disabled is shared by the Ministries of Health and Social Action. The Ministry of Health provides medical services when they are needed. Responsibility to equip a disabled person with legs, or braces to wear, or to provide for rehabilitation and reintegration into society falls on the Ministry of Social Action.

d. Amputees

The most obvious population among the physically disabled are the nation's amputees. This problem stems almost entirely from the current situation of conflict between the forces in Phnom Penh and the military elements on the border. It is a problem that affects some 3,000 people in the camps in Thailand and probably twice that number of people inside Kampuchea.

Amputees are generally victims of mines, large numbers of which have been planted by various parties along the border. The guerillas also plant them in roads and at random points inside the country. Most casualties are military, but substantial numbers of civilians are also injured. The great majority of amputees have lost a leg, generally below the knee, while some have lost both legs. A few lose arms, and a small number lose both arms which makes them totally dependent on others for care.

The great majority of amputees in the border camps has been fitted with relatively simple artificial legs by an NGO, Handicap International (HI). Wood-and-bicycle-wheel wheelchairs are also made and provided to those who need them, as well as crutches. Amputees are often trained to repair and make artificial limbs in order to be less dependent upon the services of HI for their own maintenance. Services are provided in all accessible camps.

Inside Kampuchea, services to the disabled were under the Ministry of Health until 1987. Now, the Ministry of Social Action is responsible for a national rehabilitation centre in Phnom Penh, and some 11 provincial workshops making artificial legs for amputees. NGO assistance has been provided by the American Friends Service Committee, with technical staff often seconded from HI. The production of artificial legs, more than 600 in 1988, is only beginning to keep pace with the number of amputations. There is no official count of amputees, but it is reasonable to assume it is at least double that of the border populations, i.e. more than 6,000, only about one-third of whom have received artificial legs. Since artificial legs need frequent repairs and replacement, the capacity to make several thousand artificial legs a year will need to be a long-term part of the services of the Ministry of Social Action.

A few years ago it was very common to see amputees without artificial legs aggressively begging in downtown Phnom Penh. That appears to be less common now. There is little systematic information on the degree to which amputees with artificial limbs have been able to earn a living on their own. Such scattered information as is available has been encouraging. Amputees are reported making their living as farmers, and have been seen riding bicycles. The Ministry of Social Action would like to develop vocational training programs for amputees and other disabled persons.

Resettlement of people now on the border to the northwestern provinces would suddenly add a large number of amputees to provinces which are not now equipped to cope with such numbers. Many of those who would be resettled have relevant skills making and fitting artificial legs. This situation offers a good opportunity for advance planning in how to make use of the resources on both sides to help meet future needs.

e. Other physically disabled

UNICEF-sponsored surveys in 1986 and 1987 attempted to identify the prevalence and causes of disabilities among children. They found the overall incidence of disabled children relatively low, by WHO standards, involving 3-4 percent of children under 15. Hearing and speech problems were evident in about 40 percent of the disabled population. Nearly 30 percent suffer from other physical disabilities.

Polio, meningitis, and encephalitis seemed to be the causes of more than 60 percent of these other disabilities.

A limited amount of physical therapy is available now, but only at the national rehabilitation centre in Phnom Penh. Physical therapy is being taught at the Ecole des Cadres Sanitaire. Its first graduates will emerge this year and will work in hospitals in Phnom Penh. As yet there is no systematic training in brace-making (orthotics) or provision of braces to those who need them, e.g. children with polio. Prevention through immunization is clearly the most efficient way of addressing the future of this problem, but brace-making (orthotics) should be available to disabled people in Kampuchea.

People with leprosy form a special sub-group of the physically disabled. They have been identified as a group needing special attention since well before 1970, and about 600 of them are receiving treatment now. Isolation of lepers into separate villages has been part of the traditional approach. NGO help is now being provided, both to treat the disease and to help cope with its physical effects. The living condition of lepers is extremely poor. Education of the public for a greater acceptance of people with this disease will be an important part of any program in this area.

The registry of disabled persons among the border populations suggests that there are about 5,000 people who are physically disabled but are not amputees. The nature of these disabilities is not clear from the summary report, but presumably reflect an array of hearing, speech, and congenital problems.

f. Persons with mental and emotional problems

There is no clear indication as to what extent mental and emotional problems affect the population. Observers familiar with the reports of life under the Khmer Rouge repeatedly state the expectation that mental and emotional problems are widespread. There are some dramatic cases of individuals who suffer from the trauma of that era, but there are no clear statistics as to how widespread or severe the problem may be. The UNICEF study cited above suggests that 14 percent of children under 15 have some kind of mental disability. Certainly the traumatic nature of the country's recent history, embracing, as it did, the entire population, would lead to speculation of very widespread mental and emotional problems. Similarly, one can speculate that severe nutritional problems under the Khmer Rouge could have affected the mental functioning of small children in particular. However, there are no statistics available to support or challenge such conclusions.

Analyses of social and psychological problems in the populations in camps in Thailand suggest that being confined to camps for so many years is having an observably deleterious effect on the mental health of the population there. Presumably resettlement would be the most effective way of addressing this problem.

At this time, mental and emotional problems do not seem to be affecting the Khmer population in a way that would require large scale, immediate attention except, perhaps, for groups on the border. However, aid agency personnel working on village level projects of all sorts might want to gather information on mental health as they develop a better understanding of daily life in Kampuchean communities.

5. Summary

In summary, the gradual restoration of the extended family network appears to be the most effective means of taking care of the young and old who are left without immediate families to support them. Peace and economic development would appear to be the most significant contribution to this end. Physically disabled people need more of the services which are now being made available to them. The public also needs to be encouraged to accept the view that disabled persons can be contributing members of society. It would seem appropriate to gather information on the extent and impact of mental and emotional problems.

It is difficult to suggest measures by which the international community could assist in the alleviation of difficulties faced by disadvantaged groups. However, it is strongly suggested that the work of the NGOs in this field be studied and replicated to the extent possible.

E. SOCIAL ORGANIZATION

1. Overview

With family life and other traditional social tenets savagely disrupted by the death and displacement that occurred through the 1970s, rebuilding the fabric of society is a prerequisite for both economic progress and political stability. The approach to this problem adopted over the past 10 years appears to have been essentially pragmatic, allowing the revival of traditional Khmer social structures - notably the family and Buddhism. At the same time, extensive use has been made of both communal and mass organizations which combine social and political purposes. Communal groups appear to have played a critical economic role also, especially in the early years when the weakness of delivery systems, land tenure and other economic infrastructures made individual or family action impractical.

Apart from the Party, the most important instrument for mass political organization has been the National Front for Construction and Defence, which has *the function of gathering all classes together without regard for political tendency, (and) serves as a bridge between Party and people in both directions to facilitate the flow of information from the central authorities to the population and feedback from the people to the government.* Membership in the Front is open to all Khmer, and it serves as the main means of organizing grass roots participation in village, district and higher levels of administration. In these respects it is similar to the Popular Socialist Community (Sangkum Reastr Niyum) which Prince Sihanouk used as the instrument for unifying all streams of political opinion in the 1960s.

The Revolutionary Women's Association has a very large national membership - it claims 1.8 million over the age of 18 - and has both propaganda and lobby functions. So far, its possible economic role in developing practical women's programmes, seems to have been less important than its promotion of the "five virtues" of good production, obedience to the Party and the State, good solidarity, development of culture and education, mothers and educators of children. It has made an important contribution in fields such as literacy. The other mass organizations are the Youth Organization and the Association of Kampuchean Trade Unions. The latter does not offer automatic membership, and appears to have functioned more as an instrument to encourage diligence than as a body to represent workers' interest.

The above institutions (like the *Krom samakki* discussed in Section 2 below and its non-farm private production group equivalent, the *krom pholatakam*) may now be playing less critical roles in promoting social adhesion than they were intended to do in the early 1980s. They clearly retain important functions, although these now complement the contributions that can be made by more traditional institutions such as religion and family. While Buddhism may not regain its former dominance of education, its restoration as the national religion paves the way for *Wats* to resume their role as social community centres and for moral values to have a strong influence on social behavior once again.

The most important institution in this regard, however, may be the family. As soon as it was practicable, the present regime abolished the communal eating and dormitory mode of living which had been adopted for much of the population in 1975-78, and encouraged the restoration of family life. In addition to its social dimension, the family has had its important economic role restored. This has been most notable in agriculture, where the family farm is again the basic economic unit, whether or not it operates within a communal framework. But it has also emerged as a major force in the recovery of non-farm economic activity, dominating the generation of value-added in most manufacturing and service industries.

2. The *Krom Samakki*

The *krom samakki*, or solidarity group, was instituted in 1979 as a means of coping with the chaotic situation resulting from the upheavals of the 1970s. Under the Khmer Rouge all farm tools and draft animals had been employed collectively, with the result that they were in very short supply in 1979, with ownership hard to trace. Khmer Rouge efforts to rationalize the boundaries of fields into geometric shapes, or to cut new canals through the countryside made it hard to identify previous ownership patterns. Large segments of the population had been moved forcibly away from their former villages, and while most people attempted to return to their place of origin, many had died, fled, or settled elsewhere. And the population that faced the task of rebuilding the country was seriously short of young adult men.

The *krom samakki* system provided particular support to widows and others cut off from traditional support systems. It is worth noting how it functioned in some detail, in order to assess the implications of its termination for widows in particular.

It was designed as a system of sharing material resources, labor, and production. The goals, organization, and rules of the system were spelled out in detail in a booklet issued in August 1980. However, the system was more complex than villagers could readily master, and eventually three levels of *krom* emerged, with Level One reflecting that of the 1980 booklet, and Levels 2 and 3 reflecting adjustments and adaptations made by farmers.

The amount of land varies from one *krom* to another depending on the quality of the land and the size of the *krom*. Rice fields of each *krom* are contiguous so members do not have to travel far while working. Draft animals, ploughs, harrows, *rohat*, hoes and ox-carts are technically privately owned but used in common. *Krom* members are often relatives and live near each other. Members elect a leader, a deputy, and a secretary. The leader relates to outside groups such as the village or central government. The deputy, often a woman, organizes the daily work for the members of the *krom*. The secretary keeps records of work done, and the production and distribution of rice and other commodities.

All members are categorized into three "Forces", ostensibly by common agreement. Force No. 1 includes those who devote all their working time and capacity to agricultural production. It includes members not in school, and over 16 (or sometimes 18) and under 50 (sometimes 60). Force No. 2 consists of school aged children, generally in the 10 to 15 age range (but also as young as 5). Most schooling is half day, so school children can spend half their time doing farm work such as looking after animals, working the *rohat*, etc. Also in Force No. 2 are older people who can do only light work around the house. Sometimes they have *krom* assignments such as watching children, or making mats, baskets, or utensils. Force No. 3 includes infants and preschool children. People who are disabled, non-working elderly, or those with chronic illnesses are judged on a case by case basis as to which Force they should belong. Since membership in a Force also defines how much of the group production someone receives, *krom* vary in their judgments as to whether an individual should be classified according to production potential or consumption needs.

The distribution of produce at harvest time is according to the various Forces. During harvest season, at the end of each day the paddy which has been threshed is divided up, and each family takes home its share (although this may vary). The proportions allocated each Force are not uniform, but generally, if Force 1 workers are given 100 percent, Force 2 will get about 2/3 or 3/4 as much, while Force 3 people will get 1/3 to 1/2.

The owners of draft animals, when identified, may or may not get an additional allocation of rice that can be as much as that earned by a Force 1 member. Owners can sell, use or change their animals in any way, but they are generally tended as a whole by children in the cooperative.

In Level Two *krom samakki*, the group's land is divided up among the 6 to 8 member families according to the number of people in each family, who work it and keep the after-tax produce. Major labour tasks such as ploughing and harvesting are performed in common across the group land, but animals and tools are owned privately. In a variation which Boua and Kiernan name "Level 2.9", the group operates a labor exchange system ("mutual labour sharing"). Labour performed on one family's land by members of another family has to be repaid by the beneficiary, usually exchanging one day for one day. However, a half day work by a man with a pair of oxen commands a full day work of transplanting or harvesting in repayment. Level Two *krom* were entitled to state subsidized agricultural inputs, and were in turn required to sell a portion of their produce to the state at state prices. Recently, these have come close to the free market level.

Level Three *krom* used to be most common where land was plentiful and the goal was to try to get people to plant as much land as possible. Land is divided up among the members for private use. The means of production are privately owned. Families must deal with their own production problems. This can be hard for families without adult men. Widows have sometimes appealed to have a Level 3 *krom* become more collectivized, but more often, if they could not sustain themselves in a Level 3 group, they needed to move in order to join a higher level. Traditional labor exchange is still practiced in Level 3, but generally within extended families which may or may not coincide with *krom* membership.

Over the years, the employment of the three types has fluctuated, as indicated in the following table:

Year	Level One	Level Two	Level Three
1979	3	27	70
1981	22	57	21
1982	38	53	9
1983	35	55	10
1984			
1985			
1986	30	60	10
1987	12	68	20
1988			
1989	1	9	90

Boua and Kiernan wrote in 1987:

> *Level Two Krom Samakki is by far the most popular agricultural practice... People usually say they chose Level Two because of the unproductiveness of Level One practices, where members of the krom "wait for each other" to work. People generally prefer Level Two because they want their own plot of land to tend year after year, and improve its quality by adding more fertilizer (manure or leaves) or raise dikes... People are also more keen to look after their own crops... They also like the fact that their means of production (animals, plows, rohat, ox carts) are not used freely by the collective without compensation... It was pointed out to us that in villages where Level One Krom Samakki are practiced, the number of draught animals decreases; however it increases where Level Two Krom are practiced... Widow and families with few means of production can also survive Level Two.*

Boua and Kiernan also write,

> *Perhaps a third of rural families in Kampuchea today (1987) could not survive as private farmers for lack of tools, draught animals and male labour power, even if land were to be fairly distributed. The Krom, by sharing both resources and benefits, provide them that safety net... At some point, Kampuchea may have to choose between equality and economic development, between political goals and production goals. In the country's impoverished state it will certainly be very difficult to achieve any major political goals without substantially increased levels of production.*

The system has been modified over the years, with "private economy" officially recognized in 1985 (as distinct from "family economy"). But a resolution in April 1989 on land reform, endorsed by the Second National Conference of Cadres proposed that individual farmers and state officials be entitled to private ownership of land for farming or gardening. Such ownership rights were part of the constitutional amendments adopted by the National Assembly in May 1989. The Department of Rural Economy, formerly responsible for promoting the *krom samakki*, is being changed to a cadastral unit to oversee the privatization of agricultural land. Details are still being worked out.

The statistics on the use of *krom samakki* reflect these developments, showing almost complete abandonment of the system. Level Three *krom* exist mainly as administrative units for tax and record keeping purposes, and occasional collective action. Rice crop production statistics would seem to bear out the thesis that greater privatization results in a larger rice harvest. However, the implications for widow headed households are not at all clear and are far from encouraging.

3. Community Work

Collective or cooperative labor on community projects is a well-established aspect of life in Kampuchea, dating back to the colonial days and before. In 1979, when so much of the country's infrastructure was non-functional and the government was without resources, volunteer collective labor became virtually the only way to undertake development projects. Even today the whole government functions along these lines. Salaries are low - virtually semi-volunteer - in order to increase the budget available for development.

According to the SIDA report, Khmer men traditionally did the heavier farm work of ploughing, harrowing and clearing land. It was also reportedly the men's role to carry out the construction and repair of irrigation works and community buildings. Today, although men still do much of the house construction, a very high proportion of the labourers on community irrigation and construction projects are women. Women are particularly prominent doing hoe-and basket work, moving earth, sand or gravel. Men are more likely to be found doing carpentry or cement construction work. The work the men do is more likely to be paid. The unskilled work of moving earth is likely to be volunteer.

Boua and Kiernan discuss a relatively large canal digging project in Takeo province which required people to leave their homes and stay at the work site as follows:

> *Each year since 1986, thousands of men, women, and schoolchildren were mobilized to participate in the digging. One person from each family has had to work for two weeks, some up to four weeks each season. Except for resettlement families, none escape this obligation... Some families who could not contribute for reasons such as health still had to hire someone to go in their place... These people, especially poor widows, have to subsidize a state project. It is no consolation to them that the compulsory requisition of labour has a long tradition in Khmer and French colonial practice...*
>
> *At the worksite people from the same village or district were placed together in groups of ten or twenty. Tasks were allocated to the groups, village by village. While some groups were remunerated according to the amount of earth moved, others were paid according to the number days worked; the rates were 2 kilograms of milled rice per cubic meter of earth, or per person per day. The rice was handed over to the group who elected a cook. Usually people would get a kilogram of rice to eat per day, and the rest of the rice would be bartered for fish, meat, vegetables or other foodstuffs, or sometimes it would pay their way into evening entertainment, such as a video screening or a theatre performance. Some people told us they found the atmosphere of the diggings rather pleasant.*
>
> *At the end of the work period, people rarely had rice left over to take home. We met only one such person... But generally the opposite was the case. People had to bring rice to the diggings with them, or spend their own money on other necessities while there... Among those we interviewed there seemed to be a consensus that Canal 15 was a contribution they made to the state each year, and they did not expect a remuneration... Compared with the labour to do other farm work, for which the free market price ranges from 50 to 100 riels per day plus two or three meals, Canal 15 pays badly at 2 kgs. of rice per day, or about 30-40 riels...*
>
> *School children were mobilized during school hours... For two days per week during the digging season (February to April) the whole (primary) school took part in the digging of Canal 15. The students brought their lunches with them and returned home each afternoon. Their labour was unpaid.*

Boua and Kiernan recommend that the NGO involved should not provide food for work, but instead support the project with enough funds to pay for workers at regular wages.

Another NGO assisted project involves canals and a variety of reinforced cement water control structures. NGO staff described the population as comprised

> *mostly of women and children, very few men... There seemed to be many widows in the village. They complained that there are no men in the village now to help with the rice fields. They hire a man from a neighboring village to work for them, plowing the field at 100 riels per morning... Most people in the village eat only two meals a day... It cost 15 riels to go [to the market town] by scooter bus. On any given day, one or two people will go to the market while the others give them money to buy food for them as well. Some days they cannot afford to buy anything. They can buy clothing maybe once a year, a new sarong.*

For the irrigation project, the Central Hydrology Department was responsible for providing a site engineer and construction crew, earthmoving equipment and operators, as well as local materials, salaries for concrete workers, and "food for work" rice for earthworkers. The District provided teams of 600 workers for earthmoving, organized by District and Village leaders. The NGO provided construction materials and equipment, and a civil engineer. The report congratulates *the villagers for their effort under very harsh working conditions. They are the backbone of this project and without them no work could continue.*

The report details some of the work situation, as follows:

> *About 15 local villagers came to help with the construction work. However, after a week or so, only about 5 or 6 people were left, mainly teenage boys and girls. These few people continued working until near the end of the season when it was necessary for them to begin work in the rice paddies... The (working) group was made up of 8-10 construction workers from the Hydrology Department and 4-6 local villagers.*
>
> *Canal L4 was scheduled to be dug in 1988 by manual labour giving the labourers "food for work" rice as payment. A total of 40 metric tons of rice was allotted for the project, but there seemed to be a problem distributing it... It took until the end of April to solve the rice problem and organize people to come and work to dig canal L4.*

> *On April 25th villagers from seven Khums began to arrive on site to dig the canal. It was originally planned that they would work for 15 days. But after 15 days the work was still not finished, so the work groups rotated, bringing in a new set of people to dig. It is estimated that by the time the canal was finished the actual number of people that came to work was three times that of the 605 people planned. [The report includes photos depicting the work, which show that most of the earthmoving work was done by women.]... It took 605 people a total of 30 days to move 6,780 cubic meters of earth for an average of about 0.4 cubic meters per person per day.*
>
> *Many villagers asked if [we] could provide canal crossings for them, and so it was decided to build a few bridges in key places to satisfy the needs of the villagers... A group of 10 villagers easily finished the four bridges in two mornings. Another group of villagers came back later to raise the bridge approaches to the same level as the bridgedeck. The construction of the bridge was all voluntary. [Photos show these work crews made up of men.]*

In evaluating the work, the report notes:

> *Only one construction crew was formed this year due to difficulties in recruiting villagers... [The construction crew included a dozen people] all provided by the Hydrology Department. In addition to these people, a core group of 4 to 6 villagers worked the entire season until it became necessary for them to plant rice... Salaries for the construction crew were provided by the Department of Hydrology. Village workers received 30 riels per person per day that they worked. [Evidently this applied to the core group only.]*

It might be noted that at 2 kg. per labor day, 40 tons of rice would provide for 20,000 labour days. If for 30 labour days there were 605 people each day, that would be 18,150 labour days for that portion of the project.

Assuming large scale external assistance to Kampuchea once settlement is reached, it seems reasonable to project a great number of construction projects which involve large numbers of village workers. Often, their labour is described as the government's contribution to the project. However, unless arrangements are made to pay the workers in cash, the contribution will actually come mostly from rural women, and particularly from widows.

F. CULTURE AND TOURISM

1. The Cultural Heritage

a. Recent developments

To the Khmer peoples, their part in the history and cultural evolution of Southeast Asia is expressed in a heritage that on the one hand includes the monuments, artifacts and documents which survive as tangible reminders of this important past, and on the other consists of the music, drama and dance that have evolved over the centuries of cultural evolution. Evidence of the importance to them of this heritage is provided in the very early efforts which were initiated, both in Kampuchea itself and in the border camps, to re-establish Khmer music and dance. In 1979, for example, the School of Fine Arts was re-opened in Phnom Penh; and from the earliest days of the diaspora, the inhabitants of the border camps were making demands for the supply of Khmer musical instruments.

Parts of the national heritage of Kampuchea have been lost through active destruction, neglect or pilferage during the past 15-20 years. However, it is understood on good authority that the contents of the Phnom Penh museum and store are relatively complete. Assistance is evidently required to catalogue the items, to re-establish order in these collections, to assess their condition, and to make arrangements to replace items that may be missing. This work has not been included in the project profile listing, but it is assumed that if assistance is solicited, it will be provided through appropriate bilateral sources.

The museum library, however, was seriously damaged, and all but a few hundred of the tens of thousands of Khmer language titles were lost. Efforts are already underway to replace this precious heritage, and generally assist in the reconstruction of the library, including the prevention of further decay of those items that survived, and the microfilming of fragile material. Further assistance may well be required to complete the work already begun.

In Battambang there were apparently two archeological museums, one in an old building

(Wat Po Veal), and the other constructed during the 1960s. Both were destroyed in the late 1970s, but it is understood that a number of the exhibits were recovered, and are now in the process of being installed in a new museum there. It seems that the police have been vigilant both in Battambang and in Kompong Som, and have been able to stop the export of a number of works of art from here and elsewhere. The above would have to be verified and a careful catalogue prepared of items which may be still missing.

A number of preparatory missions are already taking place under the auspices of the *Association des Amis d'Anger* (AAA), a Paris-based non-governmental organization. Information is also available at the *Musee Guimet* and the *Ecole Francaise d'Extreme Orient* (EFEO), which will be made available to the Khmer authorities through AAA. The International Council of Archives (ICA), which is a non-governmental organization registered with UNESCO in Paris, would be also able to assist in compilation and restoration of archives.

It is possible that other assistance, apart from that proposed below for Angkor Wat, may be required in the cultural sector, particularly in the School of Fine Arts in Phnom Penh, but the mission was unable to establish its nature and scope.

b. The Angkor monuments

The IX-XIV century stone temples forming the Angkor complex are spread over a 160 km^2 area north of Siem Reap, with the main sites being Angkor Wat and Angkor Thom. The latter has 16 km of walls which once enclosed a great city of several hundred thousand people. Its surviving structures include the immense, 49-tower Bayon temple whose distinctively carved faces are quite remarkable. Angkor Wat itself is even larger, being the world's biggest religious building. As the symbol of a civilization which once dominated all Indochina and much of present-day Thailand, the Angkor Wat towers grace the flags of all recent regimes - the Kingdom of Cambodia, Democratic Kampuchea, the PRK and the State of Cambodia which has been proclaimed by the present Phnom Penh authorities.

These, 10 other major temples and numerous smaller monuments in the vicinity, as well as several other temples within a 30 km radius, were covered by dense forest for several centuries before their rediscovery in 1860 and the subsequent restoration of many of them. The temples are large, beautifully symmetrical structures with delicate stone carvings and sculptures. Those which have yet to be restored are attractive nevertheless, because of the beauty and tranquility of their forest settings. Access for visitors is facilitated by well formed roads which link the various temples in two circuits of 27 km and 37 km.

Despite substantial evidence of the sale of Khmer artifacts in Thailand and Viet Nam during 1979 and 1980, the monuments at Angkor have apparently survived the past 20 years with a minimum amount of deliberate structural damage: this being confined to some defacement and to the pilferage of some image heads. Other problems have, however, arisen more from neglect than from actual harm being caused to the monuments. These are of the following kinds:

- the jungle has reclaimed some of the buildings, requiring selective and carefully organized clearing;

- damaged drains and successive rainy seasons have led to the accumulation of stagnant water, resulting in the undermining of the foundation of the buildings;

- bats and birds have once again inhabited the buildings and their droppings are causing erosion of stonework in places;

- lichens and other bacillus are causing stone disease and the disintegration of fragile sandstone.

Considering the gravity of the problems, and the risks that they pose to the temples, the Government in Phnom Penh has entered into an agreement with a team of 13 Indian specialists who, together with Khmer authorities and 450 workers, are working on the restoration of Angkor Wat itself. This agreement was started in 1988 and is due to end in 1992. Another agreement has recently been concluded with a Polish group, which had already worked on some of the frescoes in the Royal Palace, to undertake work on the Bayon. Furthermore, *l'Association des Amis d'Anger* is a source of information on this subject, and is planning to start restoration in the Baphuon, restarting the operations which had to be stopped in 1970.

The Angkor temples are of deep significance not only to the Khmer people but to the entire world. It therefore seems essential to focus world attention on their present condition and further preservation. To achieve this, it has been proposed that an international symposium on Angkor should be organized as soon as possible in order to initiate and co-ordinate future activities on the monuments. This proposal is endorsed, and the urgency of convening the symposium cannot be overstressed. It is therefore included in the list of project profiles, and strongly recommended that preliminary work should begin.

Angkor became a theatre of war during recent years. It is understood that mines were laid in the area. The Government in Phnom Penh has cleared large areas of the temples, and there are numerous accounts by recent visitors that it is safe to visit them. But it is possible that some outlying areas may still be infested. The whole question of mines is covered elsewhere in this report and any survey undertaken should include Angkor to verify that the whole area is now completely safe.

2. Tourism Prospects

a. The situation in 1970

According to the report of the World Bank's 1969 mission, Cambodia's prospects for tourism would be excellent once the war was over, centred largely on the country's unique Angkor Wat attractions but with some scope also for exploiting other aspects of Khmer culture - notably dance - and for beach and island tourism. In the absence of a security problem, the various attractions would be readily accessible to some proportion of the very high volume of tourists from Europe, America and Australasia who visit nearby Southeast Asian countries, as well as to regional tourists.

b. The current situation

Some tourism has been occurring during the past few years as the security situation in the Phnom Penh and, more recently, Battambang areas has improved. However, it has been largely restricted to short term visits by neighbouring Vietnamese groups, mainly conducted by Saigon Tourism in association with the Phnom Penh municipal tourism office.

Recently, however, a trickle from other countries has turned into a steady if modest inflow: the main source other than Viet Nam in 1988 was Italy; increasing numbers of overseas Khmer are arriving on visits from France, Australia and elsewhere; and the flow from Thailand (mainly by boat from Trad to Koh Kong) has increased this year along with commercial trade. According to data provided for the forthcoming SIDA report, the average quarterly inflow rose from 384 during 1988 to 630 in the first quarter of 1989 (still far below the 10,000 per quarter recorded in 1969).

In anticipation of a flourishing tourism industry following a political settlement, a national directorate-general of tourism with ministerial status was established in September 1988. Its responsibilities include development of all forms of tourism, including supervision of the existing Phnom Penh, Angkor, and Kompong Som tourism offices.

No comprehensive plan has been evolved as yet, perhaps because the authorities are expecting private investors to take the initiative when the security situation permits. However, a law and guidelines to promote and regulate the industry are currently in preparation, and several practical actions are in hand to facilitate its development.

Most progress is being made on the rehabilitation and construction of hotels in Phnom Penh, Siem Riep (Angkor) and Kompong Som. Work has commenced on some existing State-owned hotels, and permits are being negotiated for private enterprise to restore others or construct new ones, with the aim of increasing markedly the available beds from their present inadequate levels. In the capital:

- the Cambodiana Motel already has 22 bungalows to accommodate Saigon Tour groups;

- three hotels of reasonable standard are now operating (the Samaki, Monorom and White) and will become available for tourists when long stay residents relocate into villas;

- a fourth existing hotel (the Sukhalay) has just been renovated, work has begun on two others (the Camera and the 11 Villas), and four more await attention;

- the luxury Hotel Cambodiana is expected by its private (overseas Khmer and Singapore) investors to be completed within 1989, doubling the city's present capacity;

- Thai and Japanese entities are understood to be seeking permits to build two more large complexes in the same vicinity as the Cambodiana; and

- the Government has earmarked land across the river for further motel development.

In Siem Riep only the Grand is reported to be habitable since the Air France and other 1960s hotels were completely destroyed by bombing, but here also foreign interest in establishing further accommodation is likely.

The second area in which action is being taken or planned is air transport. The needs are for (1) restoration or upgrading of the airport runways, air traffic control and terminal facilities at Phnom Penh, Kompong Som, Koh Kong and Siem Riep, and (2) expansion of domestic and international air services. Thai interest has been expressed in the rehabilitation at Siem Riep, especially in connexion with the possible establishment of direct access to Angkor from Bangkok by either a private Thai airline or (perhaps after a settlement) Thai International.

Meanwhile Air Kampuchea, although run by the military, is now operating four helicopter/fixed wing civilian flights a week to convey tourists arriving by boat at Koh Kong (near the coastal border with Thailand) to Phnom Penh and Siem Riep. The present international access consists of twice-weekly flights between Phnom Penh and Ho Chi Minh City, which has connections with Hanoi, Bangkok and Paris and Moscow, and less frequent Phnom Penh-Moscow flights.

Other necessary developments include the following infrastructural and organizational measures:

(a) Restoration or improvement of the road and rail routes to the Battambang/Angkor area from Poipet on the Thai border and from Phnom Penh.

(b) Acquisition of vehicles for local surface transportation for tour groups.

(c) Improvement of telecommunications. At present there is almost no service other than military radio outside Phnom Penh, and international access depends on a satellite link to Moscow. Two foreign commercial proposals presently under consideration are the linking of Phnom Penh with Bangkok and possibly to ASIASAT, and the provision of a more comprehensive and foreign serviced system which would include both better internal services and the joining of Phnom Penh to INTELSAT (which already links Ho Chi Minh, Hanoi and Vientiane to the outside world).

(d) The training of hotel, guide and other tourism staff, making use where possible of specialists from the pre-1975 era. So far no plans have been made for a programme to instil the necessary culinary, service, museum and language skills in future recruits.

(e) Encouragement for private tour agencies to be set up to complement the activities of the new directorate-general and the three municipal offices. Until now most foreign visitors have toured under the contract between the Khmer and Vietnamese authorities, but this monopoly is not expected to be retained. Both Thai and overseas Khmer interest has been expressed in entering this field to enable independent promotion and packaging.

(f) Above all else, there is an urgent need to prepare a plan for the future physical development of Siem Reap and Angkor, so as to ensure that all of the developments listed above do not encroach upon the monuments themselves nor disturb their setting in any way. This is discussed in Chapter IV.

VI. International Responses

INTRODUCTION

Apart from the massive United Nations humanitarian aid programme between 1979 and 1981, Kampuchea has been cut off from almost all major sources of international aid for nearly 15 years. Considerable assistance has come from the Soviet Union and the Eastern Bloc on the one hand, and from a number of dedicated NGOs on the other - many of whom have stretched their mandates to provide the kinds of assistance that Kampuchea now so desperately needs but the country's whole infrastructure has suffered so much from almost two decades of destruction and neglect that nothing but a massive infusion of assistance is called for.

Considerable progress has been made in setting the country back on its feet in spite of shortages of trained people and all kinds of material reources. In order to place this in perspective, this part of the report provides a brief review of the background to international assistance to Kampuchea itself and to the Khmer population on the border with Thailand during the past 25-30 years.

A. AID BEFORE 1979

1. 1960-1975

Throughout much of the period to 1975, Kampuchea was the recipient of financial aid and technical assistance, but the quantities involved were usually comparatively small. In the 1960s, the value of aid programmes was running at a level of about US$50 million a year, and they were mainly aimed at upgrading health, education and general standards of life in the country. The main donor in those days was the United States, whose aid programme in the 1960s reached a total figure of about $350 million, it providing an estimated about 14 percent of Kampuchea's annual revenue. This level of aid ceased in 1965, when Prince Sihanouk severed relations with the US, and sought to concentrate more on self-reliant ways of building the economy. But with the advent of the Lon Nol administration in 1970, US assistance, mainly in the form of import support, became even more massive. The International Monetary Fund was also briefly engaged in the early 1970s in the attempt to provide expert assistance in matters of fiscal and financial policy, but with little result.

The other significant source of assistance throughout the period was that provided by France, the form of both aid and technical assistance, in a number of sectors, including agriculture (rubber and rice research), health education and welfare, telecommunications and city planning. The Soviet Union and China also assisted at different times in technical fields. The UNDP Country Programme document for 1972 - 1976 estimates the total level of bilateral technical assistance at about $3 million annually, though admits that these figures may be incomplete.

Cambodia only joined the World Bank and the Asian Development Bank in the early 1970s. The former's mission of 1970 is a milestone in the development history of the country, and has provided the present Mission with much valuable information on the status of the economy at that time. Although the Bank acted as executing agency for a large scale UNDP project, there was no follow up on the loan side. The AsDB apparently entered into at least one loan agreement.

The United Nations agencies were active at that time, with the World Health Organisation providing technical assistance to the annual value of about $0.75 - 1 million. UNICEF (about $0.33 million a year) and the World Food Programme ($10,000 - 40,000 a year) also assisted.

The UNDP Indicative Planning Figure (IPF) was $10 million for the period 1972 - 1976, and was therefore funding projects at the level of about $2 million a year. Although perhaps academic at this distance in time, it is perhaps worth noting that even in 1972, the main emphases in the programme were towards training, through fellowships, support for training institutions, and the action of experts training their counterparts. Insofar as sectors are concerned, a stress had been placed on the improvement of productive capacity, and in areas of government dealing with budget control and taxation policy. A number of the projects that have been included in the project portfolio in the present report, were also in the country programme of those years: follow-up studies for Prek Thnot irrigation, a city plan for Phnom Penh, assistance in planning and assistance, industrial promotion, extension services for animal breeding to name a few. The fact that all work on such projects was stopped in 1975, gives added urgency to them now.

2. 1975-1979

From 1975 to the end of 1978, Kampuchea was closed off to almost all the world, with the exception of China. While foreign embassies in Phnom Penh reported having very small staffs and being extremely circumscribed in their activities, there were reportedly ten thousand or more Chinese advisors around the country, overseeing aid from China. Undoubtedly, much of the aid was military. However, there were also technicians providing support to some industries that were kept going during the Khmer Rouge years (see Chapter III.A on manufacturing). These included the cement factory, textile factories, a variety of machine shops, brick and tile production, traditional pharmaceutical, fertilizer production and the like. Some of these industries had received Chinese aid in the late 1950s. There is very little information available as to just how much aid was provided by Chinese, but there is a legacy of Chinese-made equipment in the industries they aided, some of which is still functional and much of which needs repair and spare parts.

B. INTERNATIONAL RESPONSES SINCE 1979

1. 1979-1981

a. The emergency period

During the first part of 1979 there was international concern over the situation in Kampuchea, but very little information was available. Reports of serious food shortages in Kampuchea came from refugees in Thailand, but there was also a series of contradictory statements about conditions in the country from Khmer and Vietnamese sources, sometimes indicating that there was a problem, and at other times that everything was under control. In sum, although it appeared very likely that there were serious problems in the country, and quite possibly a major food shortage, there wasn't enough firm information on which to base an aid programme.

Throughout the first part of 1979, both the (Swiss) International Committee of the Red Cross (ICRC) and UNICEF, among others, repeatedly asked for the chance to go to Kampuchea to see what conditions were like. In May, the UNICEF Board agreed to make a joint approach with the ICRC to investigate and, if warranted, provide aid to people in Kampuchea. However, it was only in mid-July that representatives of the two agencies were admitted to Kampuchea for a very brief (2-day) stay.

They reported that the country seemed to be empty. The fields below their plane on the flight from Ho Chi Minh City to Phnom Penh looked untilled when they should have been full of growing rice at this time. Villages looked deserted from the air and there were no boats on the river. In Phnom Penh, shops and houses were ransacked and abandoned; the streets were littered with rubbish and rusted car frames. In one hospital, three doctors tried to care for 800 patients, without sheets, soap, sterilizing equipment, virtually no drugs, and extremely meager food. Water and electricity were intermittent. Food was scarce. No currency was in circulation. The ICRC and UNICEF representatives handed over to the Ministry of Health two suitcases containing 200 kilograms of drugs which were taken immediately to hospitals and quickly put to use. That was the first international humanitarian aid to be delivered to Kampuchea. The representatives of the two agencies returned in three weeks with 4.4 tonnes of aid, and on August 29, flew in 20 tonnes of emergency aid to Phnom Penh, thus beginning a program of aid that would eventually involve hundreds of millions of dollars of assistance.

b. Short-term humanitarian aid

i. Issues

From 1979 to 1981, the UN agencies and the ICRC faced extremely difficult logistic, political, and financial problems. They worked in four different settings. They provided aid via Phnom Penh and Kompong Som to people living in Kampuchea; to people in "holding centres" in Thailand (Khmers who fled to Thailand were not officially regarded as refugees but most of the world described where they stayed as refugee camps); to "the border population" a fluid group of people who came from inside Kampuchea, most of them returning after receiving aid; and finally to "affected Thais", aid being given to Thai authorities on behalf of Thai people displaced or adversely affected by the Kampuchea related events of recent years. The "holding centres" came to contain several hundred thousand people. "The border" may have had half a million at different times. The number of "affected Thais" was never clearly established, but may have been 70,000.

Because the government in Phnom Penh was not recognized at the United Nations, UN involvement was primarily through UNICEF, with its more flexible mandate, and the agencies which provide emergency relief, the UN High Commission for Refugees (UNHCR) and the World Food Program (WFP). (The FAO itself could only work through the WFP or UNICEF.)

Aid to the interior of Kampuchea immediately faced logistical and administrative problems. Roads were in terrible shape, and very few vehicles had survived. The Ministry of Health had one ambulance and no trucks. The Ministry of Transport reported having two trucks to each province. None of the ministries had typewriters, and virtually no pens and papers. The human resources were equally scarce. When the first OXFAM barge arrived in Kompong Som on October 13th, on the dock to meet the shipment were the Minister of Economy and Reconstruction, the Minister of Health, and the Minister of Agriculture, accompanied by virtually every working truck in Kampuchea, plus 50 hired from Vietnam. There were no forklifts, cranes or conveyors. Everything was carried off by weak, unskilled young men and women who had to be fed with the food from the barge.

On January 1, 1980, the Secretary-General of the United Nations appointed a Special Representative for Humanitarian Assistance to the Kampuchean People, in the person of Sir Robert Jackson whose leadership in the entire operation was widely accepted by the UN organizations and NGOs alike. In 1987 the duties of this office were assumed by the Executive Secretary of the Economic and Social Commission for Asia and the Pacific (ESCAP).

The worldwide appeals on behalf of Kampucheans drew a very generous response from the public NGOs had relative to NGO programmes elsewhere, substantial funds to support their work with Khmers. However, the bulk of the aid provided during the emergency period came through the UN and the joint UNICEF/ICRC arrangement that began in July 1979. Funds were raised at pledging conferences convened by the Secretary General or his representative, at which member nations of the UN heard reports of the situation, asked questions, and offered funds. The initial assessments of the situation in Kampuchea strongly suggested that widespread starvation was a real threat, hence the delivery of food was the dominant concern of the UN related agencies during that time.

Added to the aid from the UN and the ICRC was that provided through a dozen or so non-governmental organizations that established offices in Phnom Penh. In contrast, close to 100 NGOs eventually worked with Khmer refugees in Thailand.

Some French doctors were among the few visitors to Kampuchea in the first part of 1979. They asked OXFAM (UK) to provide help, and in late August, the first OXFAM visitor arrived in Phnom Penh to be followed two weeks later by the first American NGO delegation. All the western visitors during that time were greatly affected by the extent of destruction in the nation. They were appalled at the stories people recounted of their lives during the last few years, and were struck by the needs of the people insofar as they were visible to visitors.

Khmer refugees had been crossing into Thailand for much of 1979, but had been turned back by Thai authorities. Finally, the extremely severe physical condition of some of the refugees led to the opening of the border in October to Khmer refugees. The first arrivals were in pitiful condition, sometimes dying before aid could be given to them. Worldwide press coverage of their arrival recorded a grim sight of people on the edge of starvation. Governmental and private organizations alike were spurred into providing relief for Khmers, both in Thailand and inside Kampuchea.

ii. Aid in Kampuchea

As already stated, there was an acute shortage of all human and material resources inside Kampuchea. In late 1979 and early 1980, shipments of food piled up on the dockside in Phnom Penh and Kompong Som. Transport was needed, and the aid agencies accordingly began to ship in trucks to move the food. UNICEF brought in more than 1,000 trucks, and assisted the authorities to organise transport operations, including the establishment of a garage. OXFAM assisted with the garage, including the provision of tools and spare parts. They also brought in an additional 300 trucks. The Soviet Union brought in hundreds of trucks in 1979 and possibly thousands in succeeding years. And with all these trucks had to come the fuel to power them. It is a tribute to this operation that, 10 years later, many of these trucks are still in use.

Table VI.B.1

HUMANITARIAN ASSISTANCE AND RELIEF TO KAMPUCHEAN PEOPLE
October 1979 - December 1981

(US$'million)

	ICRC	UNICEF	UNHCR	WFP	FAO	TOTAL
KAMPUCHEA						
Food	7.0	17.5		141.9		166.4
Agriculture		11.5	3.8		40.7	56.0
Logistics	16.6	44.3	0.6		11.4	72.9
Health	8.4	5.0				13.4
Education		6.8				6.8
Operations	9.2	3.2	0.5	1.4	1.7	16.0
Miscellaneous	0.4	0.5	1.4		0.8	3.1
Total	41.6	88.8	6.3	143.3	54.6	334.6
BORDER						
Rice seed		0.9		4.0		4.9
Food, water	12.1	6.4		50.3		68.8
Logistics	5.5	3.5		1.6		10.6
Health, water	17.6	1.4				19.0
Operations	15.6	2.9		1.3		19.8
Miscellaneous	6.9	1.7				8.6
Total	57.7	16.8		57.2		131.7
1. Thailand						
- Food	2.8		32.4	0.5		35.7
- Health, water, etc.	15.9		83.3			99.2
2. Elsewhere				10.0		10.0
Total	18.7		125.7	.5		35.7
AFFECTED THAI						
Food	0.4	0.1		19.0		19.5
Health, etc.	1.2	2.0				3.2
Total	1.6	2.1		19.0		22.7
GRAND TOTAL	119.6	107.7	132.0	220.0	54.6	633.9

Source: Inter-Agency Working Group on Kampuchea, see Table VI.B.2

In addition to food and the means to transport food, assistance in growing food was the next major area of aid. At this time, virtually any aid was correctly considered "emergency". Only in 1982 and afterwards, when the emergency was declared "over" were restrictions against "development" aid applied by donors. Aid to food production came largely from the FAO. It included irrigation pumps, fishnets and aid to help restore the fishnet factory, large quantities of fertilizer and pesticides, rice seed, and vaccines and other aid to the draft animal immunization system.

The ICRC gave particular attention to hospitals and helped to bring in medical teams from national Red Cross societies, both eastern (from Poland, Czechoslovakia, and the GDR) and western (Swiss, Swedish, French, and Australian). UNICEF gave particular attention to the restoration of the school system, including school construction, classroom supplies, and drinking water systems.

Table VI.B.2

SOURCES OF HUMANITARIAN ASSISTANCE AND RELIEF TO THE KAMPUCHEAN PEOPLE UP TO DECEMBER 1981[a/]

(US$'million)

	ICRC	UNICEF	UNHCR	WFP	FAO	CTF[b/]	Total[c/]
Governments:							
Australia	4.6	2.6	3.5	5.8	1.4		18.0
Canada	5.8	6.2	2.2	4.7			19.0
France	3.1	1.1	0.1	2.5			6.8
F.R. Germany	6.1	10.0	5.9				22.0
Japan	5.2	10.9	45.0	61.3			122.4
Netherlands	1.7	4.2	2.1	3.7	2.4		14.1
Norway	0.8	2.5	0.8	3.5			7.6
Sweden	2.8	2.5	3.0	5.0	2.3	0.6	16.3
Switzerland	2.2	1.6	0.4	2.2	1.8		8.2
United Kingdom	4.0	3.3	0.7	2.7			10.7
United States	12.8	26.8	33.0	97.8	8.7	4.0	183.0
Others [d/]	3.3	3.0	3.5	7.0	0.7	0.1	17.6
Subtotal	52.4	74.7	100.2	196.2	17.3	4.7	445.7
International organizations:							
EEC	21.5	20.7	21.7	24.6	14.7		103.3
FAO/TCP/MMP					0.2		0.2
UNDP					23.0		23.0
UNESCO			0.1				0.1
WFP	0.1			0.6			0.7
CTF				4.4	0.3	-4.7	
Subtotal	74.0	95.4	122.0	225.8	55.5	--	572.6
NGOs, Red Cross Societies, UNICEF Cttees and other bodies:							
	50.4	13.4	10.0	2.6	1.7		78.2
Total	124.4	108.8	132.1	228.4	57.2	--	650.8

Notes: a. Status of contributions in cash or kind, paid or pledged, as reported to UNICEF by individual organizations as of December 31, 1981, in US$ equivalent to amounts in reported currencies. b. Central Trust Fund contributions were used for priority requirements with insufficient funding. c. Excludes $1.6m in pledges not allocated. d. Combination of 39 Governments contributing under $5 million each.

Source: abridged from Humanitarian Operations Arising out of Developments in Kampuchea, Report of the Inter-Agency Working Group on Kampuchea, February 1982.

NGO aid traditionally is extended at the community level, to villages or communities overlooked or bypassed in larger assistance programs. In these early stages, the NGO role was often as a partner with UN agencies, if generally a junior partner. Tables VI.B.1 and 2 show how this aid was used and sourced. From VI.B.2 it can be seen that NGOs provided almost $80 million during that time.

This included trucks and the workshop to service them. They also helped restore the Phnom Penh water system, and the textile factory, as well as aiding fertilizer production, building hundreds of clinics, and digging wells for drinking water in many provinces. The pediatric hospital in Phnom Penh was aided by World Vision International. The Mennonite Central Committee was the primary source of aid to the Prey Veng province hospital. Major irrigation work was undertaken by the World Council of Churches. Aid to animal health was shared by FAO, Church World Service, and the American Friends Service Committee, each focusing on different provinces.

During this time, the material needs of the populace dominated the aid program. It was recognized by the aid agencies that the shortage of trained people in all fields was a particularly crippling legacy of the 1970s. Material assistance was given to the medical and teacher training schools. Some training was offered by western technical staff such as in the OXFAM workshop. But one of the results of the political situation around Kampuchea was that there was an actual ban on westerners providing formal instruction to Khmers during this time, although "discussions" were not ruled out.

iii. Aid on the border - The Land Bridge

In 1979 and 1980 there were hundreds of thousands of Khmer in an assortment of camps along the Thai-Khmer border. The actual border was ill defined, and for various purposes the camps were considered to be inside Kampuchea, and hence not directly under the aegis of any of the UN agencies. However, because of the obvious needs of the people, food was delivered to the camps, where it was handled with varying degrees of honesty and efficiency by the camp leaders. In time, the camps to be identified with the three political factions that are currently recognized in the Coalition Government of Democratic Kampuchea. Two border operations were aimed at providing aid to people in the interior and contributed significantly to food aid in particular. The first began in December, 1979, and involved mostly food. The second took place some months later and involved mostly rice seed.

The system that evolved was relatively straightforward. Trucks carrying sacks of rice drove to a camp at Nong Chan, just inside the Khmer border, and delivered the food to Khmers to take home with them. Over 100,000 people a week came to Nong Chan in early 1980. The Khmers arrived with oxcarts, bicycles, or on foot. The rice arrived in trucks. Each Khmer received 20 kilos of rice per person, or 40 kilos per oxcart, and then turned around and headed home, generally to districts in the northwestern provinces. By the end of the year, nearly 148,500 tonnes of rice had been distributed in this way. Although the final destination of the rice could not be monitored, it was as close as the international aid system was able to get to giving food directly to people who needed it.

But it was quickly realized that in addition to rice to eat, Khmer farmers needed rice seed to plant. On the basis of an FAO analysis of needs in the various regions of Kampuchea, twenty-five to thirty thousand tonnes of rice seed were sent to Phnom Penh and Kompong Som by FAO. WFP, The United Nations, Vietnam and the NGOs. The cross border operation was called on for this purpose also, and delivered 23,521 tonnes of seed by the time it ended on June 20, 1981. Additional seed was sent to Phnom Penh later on.

c. Assessment of the emergency operation

It is hard to make an accurate assessment of the impact of the emergency aid programme partly because there is no agreement on exactly what the situation was in Kampuchea in 1979. The reports that emerged in August and September 1979 suggested that starvation threatened the entire population. Later, this did not seem to be the case, although no one could say with certainty just how bad the food shortage was. Many of the refugees arriving in Thailand were literally dying of starvation. Although their situation and did not necessarily represent the predicament of the entire population. Nonetheless, in the world's eye, their emaciated images represented the condition of all Khmers.

The authorities permitted those who grew food to keep it all, but they also passed out very little food in rural areas, on the basis that the people in the countryside were more likely to be able to produce their own. Foraging for food, rather than growing supplementary crops, seems to have made it possible for many to survive. The net effect of the emergency aid, then, was to avert catastrophe, and to help make it possible for economic life and especially agriculture to begin to be established again.

In 1979 and early 1980 there was no currency in circulation in Kampuchea. Rice was money. The government became, for all practical purposes, the only employer in the country. Except for the few who began to engage in private trading, everyone who did not grow his or her own food had to obtain it from the government. Food aid, then, helped make it possible to hire 14,000 teachers, staff all the government ministries, employ dock workers and truck drivers, and support the medical staff in hospitals, and students in the medical school as well as factory workers and street sweepers. The army, relatively small at this point and more of a militia, doubtless was fed by food aid from Vietnam or through the emergency relief programme described above.

2. The NGOs since 1982

In 1982 the emergency was declared over, and UN-sponsored assistance to Kampuchea dropped sharply. Donor governments queried sharply the use of aid for purposes they considered to be development. UNICEF, which spent close to $90 million in the two years of the emergency period reported only $1.6 million available in 1982. With emergency funds boosting the 1984 figure to $5.8 million, its budget grew slowly until in 1989 it anticipated $6.1 million available for its work in Kampuchea, making it by far the largest single international aid agency in the country.

The NGOs, for their part, had spent much of the money raised for the emergency on emergency aid. Collectively they felt a commitment to try to assist the Khmer rebuilding their society, but their resources to support development assistance were very small. Gradually, different governments began to make aid available through their NGO channels for various projects in Kampuchea. The attitude of Khmer authorities also began to change, making it easier for the aid agencies to investigate and remain involved in development projects.

As mentioned, the political circumtances relating to Kampuchea prevented UN agencies from providing development assistance. As a result, the non-governmental organizations became increasingly involved in supporting the restoration of factories, municipal services and other elements of the country's infrastructure that would normally be supported by bilateral or multilateral aid. Their resources were generally sufficient for a limited part of any task, such as medium or small scale irrigation projects, partial restoration of city drinking water systems, etc.

In recent years, they have increasingly been able to bring in expatriate technical personnel to assist in development projects. The urgency of training Khmers in technical tasks is recognized by all, but full use of the training potential of expatriate technical personnel has not yet been made.

For the second year in a row, the NGOs in Phnom Penh have issued a booklet, Humanitarian Assistance in Kampuchea, detailing the work that they are doing. The exact figures are not clear, but more than $30 million worth of aid was provided in 1989 by 28 agencies (including UNICEF, UNHCR, and WFP) to 7 Ministries, Phnom Penh Municipality and groups such as the Women's Association and the Federation of Trade Unions.

There are about 120 expatriate personnel resident in Phnom Penh, with perhaps 10 or 20 short-term consultants who come for a few weeks or months on special assignments. Nearly 40 are medical personnel, by far the largest portion, with a dozen engineers and agronomist, half-a-dozen mechanics and veterinarians, and a variety of others including 4 English language teachers. The sectoral summary of their work, annexed in (pages 187-190), provides an indication of the basic needs of the country. As the skills of their expatriate staff suggest, their aid is concentrated in health and agriculture, with substantial assistance to education and industry.

In sum, the pattern in recent years has been for the NGOs to expand and diversify their programs, as authorities in Phnom Penh have allowed additional visas for technical personnel, and as travel around the country has become both more secure and faster, thanks to improved roads. Greater access at the village level is beginning to produce a better working knowledge of life as most people live it, and how external assistance can be most productive. However, there are still very few expatriates with a working knowledge of Khmer; and as additional expatriates come to Kampuchea, all support services, including translation, will be increasingly overburdened.

The primary concern in anticipation of expanded aid is the question of the absorptive capacity of the administration. The need for planning in many areas is very urgent, so that aid will be mutually supportive and directed towards generally accepted goals. In addition, all Khmer technical people will need to be helped to reach beyond their present level of training and experience in order to take their part in new assistance programmes. Each small project will need to be a training school for larger ones and the formal training programmes will need major support so that their graduates can effectively carry out the work for which they are being trained.

C. THE BORDER CAMPS

1. The General Situation

As already described in the paragraphs above, at the end of the 1970s, the fall of the Khmer Rouge regime created a massive flood of refugees into Thailand of some 630,000 people. The first of these refugees were often former members of the urban middle class, shopkeepers, teachers and civil servants who immediately tried to escape abroad as soon as the forced labour system of the collective farms collapsed. But in September-October 1979 there began a flood of more than half-a-million ill and starving people who sought safety along the border with Thailand. These were partly the remains of the army and cadres of the Khmer Rouge and partly civilians escaping from the Vietnamese army. In response, a number of refugee camps were set up initially in Kampuchea. Many of these were set up as temporary camps, and by the early 1980s their numbers had stabilized to about 10.

In the purely material sense, the refugees lived better than their countrymen in Kampuchea or even the Thai villagers across the border: the supply of food was regular and relatively balanced; hospitals had been provided which were of a relatively high standard and there were schools which were significantly better supplied than those inside Kampuchea. This was achieved as a result of broad-based and efficient international aid activities. The United Nations with its specialised agencies had created the framework for refugee care and had taken responsibility for the distribution of food. Voluntary private relief organizations in turn took care of education, health services and agricultural programmes, among others.

Table VI.C.1

DEMOGRAPHIC CHARACTERISTICS OF UNBRO CAMP RESIDENTS

Name of camp	Population June 1989 1/	Political affiliation	Main geographic origin (%) 2/	Primary school enrollment 1989 3/	Skill training 4/	Degree of self management 5/
Site 2	182,211	KPNLF	Battambang 51.3 Kandal 7.5 Siem Reap 5.5 Pursat 6.6 Takeol 5.0 Rest 24.1	40,117	Khmer admin: public administration KWA: literacy, sewing, weaving UNBRO: stoves & watering making, blacksmithing, typing COERR: auto mechanics, radio, electricity, watch repair, machine tool practice, typing, accountancy, tinsmithing	See text
Sok Sann	9,416	KPNLF	n.a.	1,500	AFS: electricity radio and TV, repair, sewing KWA: weaving, literacy	High degree of general self-reliance
Site 3	61,466	FUNCINPEC	Battambang 51.0 Siem Reap 12.0 Kandal 6.5 Oddar Meanchey 6.1 Rest 24.4	11,000	Khmer admin: auto machines, electricity KWA: sewing, weaving, literacy	Medical programmes and some vocational training
Site 8	36,438	DK	n.a.	9,200	COERR: radio, auto engine repair, typing, sewing KWA: weaving, sewing, literacy UNBRO: tinsmithing, blacksmithing	See text
O'Trao	9,273	DK	n.a.	750	Still under discussion KWA: given weaving thread Operation Handicap: prosthetics making	See text
Borai	4,350	DK	n.a.	270	Still under discussion	See text
Site K	2,566	DK	n.a.	nil	Nothing yet begun	See text

Notes:

1/ Source: UNBRO

2/ Site 2 figures from Ford Foundation survey June 1989, Site 8 khmer administration survey December 1988. Data for Site 8, also surveyed by Ford Foundation not available at time of going to press. Ford Foundation figures relate to place of birth, Site 8 figures show last place of residence.

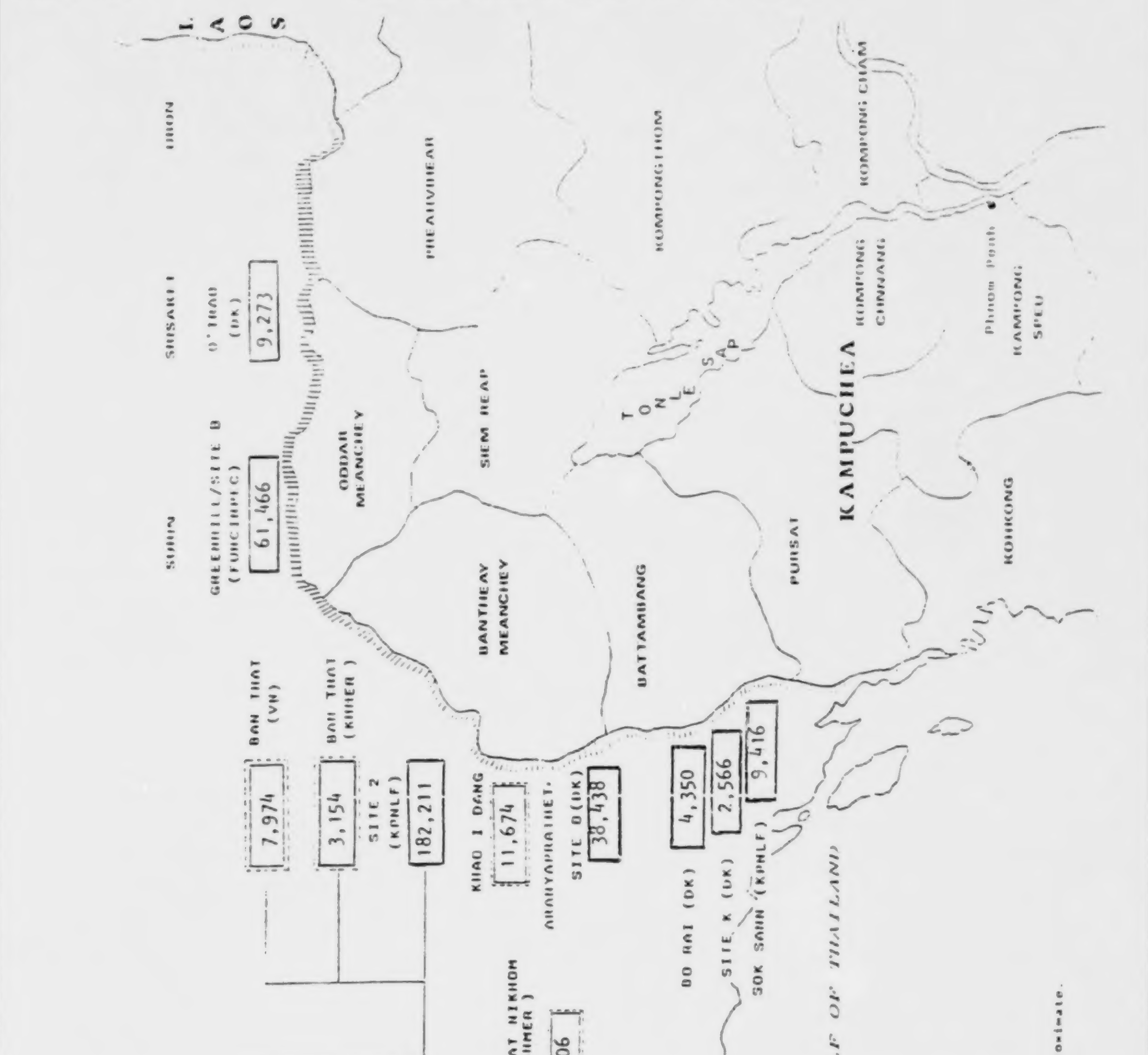
3/ Source: UNBRO. O'Trao and Borai figures relatively low because programmes are new. Site K is the newest camp and programme not yet begun.

4/ Source: UNBRO. Teacher/facilitator underlined, e.g. Khmer Women's Association.

5/ Source: UNBRO.

Chart VI.C.I

CAMP LOCATIONS AT/NEAR THE THAI BORDER


KHMER
DONG RUK 25,183
SAN RO 16,207
BAN SANGAE 31,567
NONG CHAN 29,585
SAMET 79,669
7,974 BAN THAT (VN)
3,154 BAN THAT (KHMER)
SITE 2 (KPNLF) 182,211
THAILAND
KHAO I DANG 11,674
PHANAT NIKHOM (KHMER) 2,806
ARANYAPRATHET
SITE 8(DK) 38,438
BO RAI (DK) 4,350
SITE K (DK) 2,566
SOK SANN (KPNLF) 9,416
307,765 UNBRO - Assisted KHMER
17,634 UNHCR - Assisted KHMER
GULF OF THAILAND
SURIN
SRISAKET
UBON
GREENHILL/SITE B (FUNCINPEC) 61,466
O'TRAO (DK) 9,273
L A O S
ODDAR MEANCHEY
PREAHVIHEAR
BANTHEAY MEANCHEY
SIEM REAP
BATTAMBANG
TONLE SAP
KOMPONGTHOM
PURSAT
KAMPUCHEA
KOMPONG CHNNANG
KOMPONG CHAM
KOHKONG
Phnom Penh
KAMPONG SPEU

BREAKDOWN BY ADMINISTRATION:

KPNLF	191,672
D.K.	54,627
FUNCINPEC	61,466

6 June 1989

Note:map not to scale. Location approximate.
Source: UNBRO

In 1984/85, renewed military activity within Kampuchea forced the relocation of the camps in Thailand, where they now remain. At present, about 300,000 Khmer live in seven UN-assisted border camps. Another 15,000 live in the UNHCR-assisted camps of Khao-I-Dang and Ban Thad (in Site 2). In the period between the time of the emergency in 1979-1980 until the end of 1981, the management of relief operation was undertaken by UNICEF. In January of 1982, the UN Border Relief Operation (UNBRO) was created to take over the lead UN role.

The organisation of the camps is such that each of them has a political affiliation with one of the three members of the Coalition Government of Democratic Kampuchea (CGDK). They are the Kampuchean People's National Liberation Front (KPNLF), the Sihanoukist faction (FUNCINPEC), and the Khmer Rouge component know as the DK (for Democratic Kampuchea). Table VI.C.1 and the map in Chart VI.C.I show the general locations and characteristics of the camps.

Among the UNBRO-assisted camps, the KPNLF administers Site 2 and Sok Sann. FUNCINPEC has one camp, Site B. The DK faction controls Site 8, O'Trao, Borai, and the newest camp, Site K. Access to these camps and security therein is regulated by the Royal Thai Army through a mostly volunteer force called the Displaced Persons Protection Unit (DPPU), created in 1988.

UNBRO is responsible for providing food, water, shelter, and relief supplies to the border Khmer. In addition, material assistance and technical support are provided to Khmer-managed activities, notably primary education, adult literacy, social services and self-reliance projects.

UNBRO is also responsible for the coordination of funding and services provided by twelve voluntary agencies. These services include supplementary feeding of vulnerable groups, primary health care, printing school books, physical rehabilitation, public health, sanitation, as well as special education for disabled children. Emphasis is placed on training Khmer staff to promote self-management.

2. The Camp Populations

a. Demographic characteristics

Statistical data from the camps is not always available or accurate and its quality can vary from camp to camp. Data is available from the Camp at Site 2, which, because it provides refuge for almost 60 percent of the entire camp population, may be representative of the entire camp population. This camp at present accommodates approximately 182,000 people, or almost 40,000 families, with an average size of family of 4.6. The age-sex structure of the population in the camp shows that an approximate parity exists between males and females in all age groups, which is quite different from the situation inside Kampuchea itself (see Chapter I.C above).

Other statistical information about the camp populations, including the geographical origin of the Khmer in the three largest camps (Site 2, Site B and Site 8, which between them house more than 90 percent of the entire camp population), is expected to be available in August 1989, based on a Ford Foundation survey of 18,500 heads of family.

The preliminary data for Site 2 became available in early July and is shown in the following table.

Place of birth and preferred province of return for returnees

Province	% born in province	% preferring to settle in province
Battambang	51.30	63.54
Kandal	7.51	10.57
Siem Reap	5.52	5.91
Pursat	6.58	4.72
Takeo	4.89	1.60
Kompong Cham	4.36	2.55
Oddar Meanchey	2.59	1.90
Kompong Thom	1.80	1.29
Prey Veng	1.86	0.92
Kampot	1.86	0.75
Kompong Speu	2.09	0.71
Other	9.64	5.54
	100.00	100.00

It is clear that the great majority of people come from Battambang province (51 percent), and that an even larger proportion of people (64 percent) have a preference to return there. This emphasises the fact that the main impact of returning populations will be felt in this province, a fact that has received attention in other chapters of this report. The table also shows that there is an apparent preference on the part of most families to settle in the north-west of the country rather than in the south, even though a fair number of them oritginally came from the south.

b. Education and training

i. Basic education

According to the Ford Foundation survey, close to 60 percent of family heads at Site 2 are literate, but this may be lower in other camps. On the other hand, more than 40 percent of all family heads have had no education at all, and upwards of 75 percent have had no more than three years of primary education; the need for further education and training is thus underlined. However, regardless of whether they are literate or not, many Khmer women in the large camps should possess a relatively good awareness of health and nutrition because, in order to qualify for supplementary feeding of infants, mothers must have attended courses in these subjects.

Furthermore, roughly 30,000 Khmer adults have acquired practical knowledge and experience in a wide variety of activities because they were employed by UNBRO, by the voluntary agencies or the Khmer administrations in one capacity or another. This estimate is based on the number of recipients of "Worker rations", which are issued to persons in different types of employment as set out below.

Until a few years ago, there was little education available for children, but that situation has now changed completely, particularly since 1988. Primary school enrollment figures for all camps reflect the trend: 1987 - 51,104; 1988 - 56,145; 1989 - 72,673 (projected). It is expected that by the end of 1989 there will be some 1,640 trained teachers at the primary level. The Catholic Office for Emergency Relief and Refugees (COERR) is providing post-primary theoretical and practical education, and UNBRO is funding an IRC-operated printing project to provide texts for primary school children. In addition to this, many Khmer youngsters receive some type of pre-school experience as, for example, when their mothers attend literacy classes.

ii. Vocational training

UNBRO provides for training in carpentry, stove making, tinsmithing, waterjar making, weaving (both cloth and mats), sewing and toy making. COERR recently expanded, with UNBRO funding, their existing vocational training programmes to include welding, fitting, basic electricity and small engine repairs; skills that will be useful on repatriation. ILO has recommended other types of vocational training such as masonry, labour-intensive road and bridge construction, and the repair of machines (e.g. photocopiers) used in small businesses. ILO has been requested to identify a vocational education specialist to further implement and/or expand such training.

iii. The Institute of Public Administration

One potentially important initiative that has taken place under the auspices of the KPNLF is the establishment of the above Institute in Site 2, whose aim is *to provide training in public administration to existing and new officials [by] upgrading their knowledge and helping them to improve their professional skills*. Offering courses in some 12 subjects including management, law, public administration, economics and Khmer culture, its basic philosophy reflects the need to establish high standards and efficiency in public service, and responsiveness to public needs.

c. In-camp occupations

"Worker rations" of seven kilos rice/week are issued to about 30,000 camp residents for services rendered in the camps. In addition to providing some meaningful "Khmer help Khmer" activities, these jobs constitute a type of non-formal education. There are many categories of employment. Responsibilities range from direct service delivery to programme management, planning and evaluation. Some typical examples are:

Traditional medicine healers
Janitors
Section leaders
Medical instructors
Hospital/OPD/Pharmacy attendants
Ration monitors
School teachers
Fire Prevention/control operators
Buddhist educators
Drivers
Mother and child care workers
Khmer police
Dental assistants
Construction crews
Weaving/sewing instructors
Dance/drama instructors
Machine maintenance/repair
Pump operators
Garbage collectors
Office workers
Printing teams
Sports assistants
Survey teams
Prosthetic device makers
Agriculture instructors
Radio operators
Community health outreach
Physical rehabilitation

Aside from the skills involved in these jobs, many employed Khmer learn to speak English or French and pick up the rudiments of management. The acquisition of practical abilities is reflected in the private entrepreneurial "moonlighting" that takes place in some camps where the Khmer run their own tutoring and medical services, barbershops and other small enterprises. Some of the Khmer administrations have demonstrated considerable initiative in training their own people.

At Site 2, there are 125 Khmer enrolled in the KPNLF-run Institute of Public Administration referred to above. The Site B administration in late 1988 came up with its own plan for medical care supervision. Other Khmer administration-initiated or UNBRO-supported activities include agricultural training, vocational skills training and law/justice instruction.

A great number of NGOs have been active in assisting camp populations to gain knowledge and experience which will be of benefit to them once they return to Kampuchea, and in general to try to mitigate the lot of those that have being staying for long years in camps.

In addition to industrial/commercial skills transfer, most camps grow crops and vegetables, and raise pigs, chickens and ducks using modern methods. In all camps, UNBRO supplies seeds, seedlings, fertilizers, tools, animal medicines and is developing training facilities and management expertise in Site 2. UNBRO and COERR support a 3-tiered education and training programme, and COERR supports "modern" chicken projects.

The Khmer administrations have a network of section leaders who oversee their administrative segments of the camp. There also exist Khmer police forces who work with the Thai staff of the Displaced Persons Protection Units (DPPU) to maintain order. All the primary school teachers are Khmer as are the teacher trainers (the trainers' instructors are non-Khmer) in all camps with UNBRO-supported education. The same is true of KWA instructors.

d. Issues

A degree of dependency among camp residents has inevitably been created by their situation. In addition to promoting "Khmer Self Management" within the camps, as the time for voluntary repatriation nears, an increasingly important issue is the need to re-train residents in self-reliance. It should be emphasized that only about 10 percent of Khmer have had the opportunity to find employment or other gainful activity in the camps.

Another pre-occupation must be concerned with people's perceptions of what their occupation will be when they return to Kampuchea. The Ford Foundation undertook a detailed study of the occupations of the Site 2 household heads during the different government regimes, and what they expected to be doing on their return. Some results of this study may be summarised as follows:

Before 1970
- 56% were either children or students
- 34% were farmers
- 3% were vendors

1970 - 1975
- 33% were children or students
- 47% were farmers
- 3% were vendors

1975 - 1979
- 85% were farmers
- 5% were general labourers

After 1979
- 54% were farmers
- 28% had no occupations
- 6% were students
- 4% were vendors

On return
- 58% expect to be farmers
- 21% expect to be vendors
- 6% expect to be in the police or the military
- 2% each expect to be health workers, monks, and teachers

(Note: Only those occupations having more than 1% of the respondents are listed. The other occupations covered by the survey, but not in the list above are: civil servants, drivers, fishermen, gem workers, housewives, tailors, and other unspecified.)

The main change which the list shows is the expectation on the part of one in five of the returnees that they will be vendors of same kind when they return. However, 58 percent expect to return to the land, which is consistent with the desire of the majority to return to Battambang.

The reality of repatriation may, however, turn out to be different. As part of the study, respondents were asked about the extent to which they had maintained contact with people in Kampuchea. No less than 83 percent stated that they had had no contact at all, indicating a great lack of direct knowledge of conditions in the country. A further 6.5 percent had received letters, 3 percent had paid visits, and the remaining 7.5 percent had heard about conditions by word of mouth.

ANNEX

NGO Activities, by Sector, Within the Country

Health

AFSC - National Rehabilitation Center, Phnom Penh; technical and material support, training; 11 prosthetics workshops in provinces.

ACR - Takeo, RINE center; Kg. Cham, and Kandal, district health centres.

CIDSE - Phnom Penh, IV fluid production, traditional medicine production; Kandal, rural health programme; Kampot, district hospital.

EE - Tachmau hospital, pediatric ward; Phnom Penh, visiting faculty at medical school.

EdC - Phnom Penh, Kg. Cham, Svay Rieng, RINE centres; Phnom Penh, Municipal and Chiang Chamres hospitals; January 7 Hospital, pediatric ward; Phnom Penh, Kampot, Stung Treng, nursing schools; Kg. Cham, pediatric training; Phnom Penh, nutrition centre.

ICRC - Phnom Penh, Kampot, Kandal, Kg. Cham, Kg. Speu province hospitals, material and technical assistance; Kampot, Polish Red Cross team; Pursat, medical team.

Australian Red Cross - Kg. Speu, medical team, construction and material aid.

French Red Cross - Phnom Penh, National TB Institute, build, equip, help administer, provide drugs, training; Prey Veng, Kandal, Takeo, Kg. Chhnang, Svay Rieng, Kg. Speu provinces 60 Tb centres, regular training.

Swedish Red Cross - Kg. Chhnang, medical team, train staff, medicines, supplies construction, help with feeding, IV production, supervise RINE staff.

Swiss Red Cross - Takeo, medical team, supplies, equipment, training, administrative support.

JVC - Kandal, build a RINE center.

JANGOO - aid to national EPI programme; Kampot, Kg. Cham, provincial and district hospitals; Kampot, Regional health worker training centre; midwifery training, nationwide.

MSAVLK - midwifery training; women's health monitoring.

MCC - Prey Veng, province and district hospital; med team, multi-faceted aid.

OHI - Phnom Penh, physiotherapy training in school for health workers; Phnom Penh, shoes for leprosy patients; aid to national rehabilitation centre.

PADEK - Phnom Penh, dispensary; Phnom Penh, traditional medicine centre; Phnom Penh, Department of Hygiene; sanitation programme.

Redd Barna - Takeo, RINE centre; Phnom Penh, medical school, laboratory, textbooks.

UNICEF - EPI, nationwide, vaccines, cold chain, training, etc.; MCH, training, medicine, equipment, studies; communicable disease control; essential drugs, aid national policy, technical and material assistance including medicine and equipment; health planning, funds for study, technical assistance; health education, materials for posters, radio, medical schools, and in support of health campaigns.

UNHCR - support for French Red Cross anti Tb programme; Prey Veng. Kandal, commune medical facilities.

WCC - study tours abroad in health planing, essential drugs, health administration; Phnom Penh, dispensary, pharmaceutical industry, cotton medical product production; Phnom Penh, Kg. Speu, PMI centres.

WFP - Phnom Penh, National Pediatric Hospital, medical team and full support; RINE centres in Phnom Penh, Kandal, Kampot, Takeo, Kg. Speu, Svay Rieng, Kg. Chhnang.

And closely related to health are projects in support of drinking water:

CIDSE - Kg. Speu, wells, latrines.

JVC - Phnom Penh, Kampot, well drilling.

JANGOO - Phnom Penh, drainage study; Kampot, Kg. Cham, town water supply systems.

LWS - water drilling equipment, many provinces.

OXFAM - Phnom Penh city water supply; Prey Veng. Kg. Cham, Svay Riend, Kandal, rural water supply.

PADEK - Prey Veng, wells.

UNICEF - wells, in Kandal, Kg. Speu, Takeo, Kampot, Kg. Cham, Kg. Chhnang, Phnom.

Agriculture: general

AFSC - Kg. Chhnang, Family Food Production; teaching materials, agriculture technical school.

ACR - study tours abroad in agriculture planning; support for development of agricultural extension work; translation of teaching materials into Khmer; training librarian; Kampot, phosphate factory; Battambang phosphate factory; Takeo, integrated rural development; agricultural implements, nationwide; Kandal, agricultural development.

CWS - Kandal, seed station.

CIDSE - Kandal, agriculture technical school; Takeo, agriculture technical school; Phnom Penh, Agriculture University; overseas study tours in agriculture extension; Takeo, Prey Veng, Svay Rieng, land rehabilitation; Phnom Penh, agriculture mechanics workshop; Banteay Mean Chay, phosphate factory; Kampot, phosphate factory.

GRET - Phnom Penh, soil laboratory; national reforestation plan; agricultural implements; appropriate technology.

IRRI - Kandal, Rice Research Institute; Kandal, Kg. Speu, Battambang, research station; Training, Khmer language materials; Training, at IRRI-Philippines.

LWS - Kampot, phosphate factory.

MCC - Kandal, Prey Veng, integrated rural development; Prey Veng, hoe heads.

OXFAM - Banteay Meanchey, phosphate factory.

PADEK - Kg. Speu, rice research centre; Prey Veng and Battambang, agriculture development centres; Svay Rieng, integrated agriculture programme; Banteay Meanchey, phosphate factory; Prey Veng, village development; Family Food Production, various provinces.

Redd Barna - Phnom Penh, agriculture study.

UNICEF - Family Food Production, Kandal, Kg. Speu, Prey Veng, Svay Rieng, Kg. Chhang, Pursat.

UNHCR - Kandal, Prey Veng, integrated rural development.

Agriculture: hydrology

AFSC - Kg. Chhnang, Kg. Cham, small irrigation projects; Kg. Chhnang, pump repair workshop; Kg. Chhnang, culvert making; Kg. Chhnang, training.

ACR - feasibility study for Mekong Committee project; Siem Reap, material and technical assistance for a project.

CWS - Phnom Penh, training in heavy duty equipment us and repair; Kandal, on-site training.

CIDSE - Phnom Penh, hydrology project; Phnom Penh, technical aid to department.

JANGOO - Irrigation pumps, nationwide; Food for Work for hydrology projects.

MCC - Phnom Penh, culvert making.

OXFAM - Takeo, Prey Veng, irrigation pump repair workshop; Takeo, aid to canal building.

PADEK - Prey Veng, irrigation pump repair training; Takeo, hydrological study.

WCC - Takeo, hydrology project.

Agriculture: forestry

GRET - national reforestation study.

MCC - Phnom Penh, Svay Rieng, Prey Veng, Takeo, Kg. Chhnang, Kg. Speu, Kandal forestry seedling project.

Agriculture: fisheries

PADEK - Prey Veng, fishery project.

WCC - Phnom Penh, fishery project.

Agriculture: animal health

AFSC - vaccine making and importation; cold chain and immunization support training, teaching material preparation.

CWS - Phnom Penh diagnostic laboratory; nationwide, vaccine importation; support for immunization system.

JANGOO - Phnom Penh, pig and poultry raising.

LWS - Takeo, cattle breeding; Kampot, cattle breeding; piggery production; Kandal, poultry breeding.

Industry

AFSC - Phnom Penh, leather factory, ceramics factory.

ACR - Battambang, tinsmithing workshop; technica; documents; industrial seed production; Khmer scarf production; sugar cane processing; technical training centre; plastic bags for phosphates; Takeo, silk weaving; Phnom Penh, brick making.

JVC - Phnom Penh, Transport technical school.

JANGOO - Phnom Penh, technical school; Phnom Penh, occupational safety; Battambang, industry.

LWS - Kampot, cement factory; Kampot, bags for salt work; Phnom Penh, Oxygen, acetylene factory.

MCC - Takeo, coconut oil processing; soap making in Kampot, Kg. Cham, Battambang, Phnom Penh.

OXFAM - Phnom Penh, industrial technical school; Battambang, jute factory; Kg. Cham, textile factory; Prey Veng. Kg. Cham, ferry repair workshops.

PADEK - Phnom Penh, paper factory.

WCC - silk making, study tour.

WVI - Phnom Penh, soap making.

Education

AFSC - Kg. Cham, Regional and Provincial teacher training centres; Kg. Cham, school furniture workshop.

ACR - Takeo, Regional teacher training centre; Takeo, primary schools; Kratie, Regional teacher training centre; Phnom Penh, primary schools.

CIDSE - Phnom Penh, calk making, teaching materials; Prey Veng, teacher training school; Stung Treng, teacher training school; Phnom Penh, primary schools.

JANGOO - Kampot, provincial teacher training school, other schools; Phnom Penh, central teacher training school; Kg. Cham, primary schools.

MCC - Svay Rieng, teacher training school, secondary school; Prey Veng, primary school.

QSA - Phnom Penh, Foreign Language Institute, English teaching; Phnom Penh, special courses for technical ministries.

UNICEF - supplies, technical assistance for reading materials for women.

WFP - milk powder for schools.

Other:

Women's Association

ACR - women's groups.

JANGOO - income generating projects.

UNICEF - home-based child care programme; income generating projects in Phnom Penh, Kandal, Kg. Speu, Prey Veng, Svay Rieng, Kg. Cham, Pursat, Prea Vihear, Battambang, Siem Reap, Kampot.

Culture

CIDSE - Phnom Penh, print Buddhist scriptures.

JANGOO - Phnom Penh, School of Fine Arts, music documents; instrument making.

Orphanages

EE - Phnom Penh, Kg. Speu, Prey Veng, Kandal.

WCC - Kg. Speu.

WFP - milk powder to various orphanages.

Miscellaneous

ICRC - protection services; tracing services.

OXFAM - Phnom Penh, urban development.

VII. Project Profiles

INTRODUCTION

In its Terms of Reference, the Mission was requested to identify priority needs for external assistance and estimate the extent of resource requirements, and to recommend any feasibility studies, sector reviews or other preparatory tasks which need to be undertaken in the near future to ensure the effectiveness of future aid flows.

To meet these requirements, the Mission has drawn up project profiles indicating the scope of projects which it considers should be taken up in the course of the first phase of reconstruction in Kampuchea. These profiles cover a wide variety of activities from feasibility studies to sector reviews. The Mission has not found it possible to give an order of priority to these projects. Instead, the profiles are intended as a guide for action, and to give specific direction to the recommendations contained in the sectoral chapters. In any case, before any of them are implemented, more work will clearly be necessary to define their actual scope and content with a higher degree of precision than is possible here.

The profiles are listed in the same order as the preceding chapters of this report, where the respective sectoral discussions provide further information on the reasons for proposing them.

A. GENERAL

General Project Profile no. 1
THE MENACE OF LAND MINES

1. **Area/sector:** Humanitarian Aid/Special humanitarian operations.

2. **Location:** Selected areas of Kampuchea, to be determined.

3. **Implementing agency:** Appropriate Khmer military and civilian authorities to be identified.

4. **Objective and justification:** For almost twenty years, mines have been laid in selected areas of Kampuchea as well as indiscriminately in the countryside. Furthermore, in certain parts of the south and east, large quantities of bombs were dropped during the early 1970's, some of which may be unexploded. There is therefore a continuing danger that innocent people, particularly those returning from the border camps, will suffer. The objectives of the project will be to assist the Khmer Government to:

- Solicit and collate information on the extent of minefields and areas where there may be a danger of unexploded ordnance and bombs, and take necessary measures to mark them on maps and on the ground;

- Take appropriate measures to deal with such areas, including, if necessary, the removal of the devices and/or rendering them safe;

- Train and generally enhance the capability of units in the Khmer Government to immobilize such devices;

- Initiate training programmes, both in the border camps and in certain localities within Kampuchea, to alert people to the dangers, and train them to mitigate the effect of such devices.

5. **Project description:** An initial mission by mine disposal units from friendly governments

should visit the area as soon as possible to discuss the whole problem with appropriate Khmer authorities. A detailed plan should be devised covering all the objectives, but particularly training and advice to the local populace.

6. **Expected impact:** By seeking to mitigate the effects of the devices on the people, the project would have an important impact on the ability of the Khmer people to recover.

7. **Project duration:** Unknown.

8. **Estimated costs:** Not known; it is hoped that friendly governments could provide the services of appropriate personnel at no cost to the Khmer Government.

9. **Present external involvement:** It is understood that the PRK Government has undertaken some mine clearance operations, possibly with some external assistance.

General Project Profile no. 2

ASSISTANCE TO CENTRAL AID CO-ORDINATION AGENCY

1. **Area/sector:** General development/Public administration.

2. **Location:** Phnom Penh.

3. **Implementing agency:** Central Agency for Co-ordination of Technical Aid and Assistance.

4. **Objective and justification:** To assist the Central Government to establish systems whereby technical assistance and aid donated by international agencies, both bilateral and multilateral, are effectively listed and monitored. Such systems should be so designed that they enable adequate co-ordination to take place on a sectorial and multi-sectorial basis, and thereby facilitate decision-making by policy makers. Accurate monitoring of aid disbursement should also be installed for projects, once they are approved. It is likely that there will be a large number of offers by different donors to assist in the reconstruction of Kampuchea. It is important that these be properly co-ordinated in order that their impact may be maximized. Furthermore, it may be necessary for the Government to regulate such assistance because general staff shortages throughout government will limit the absorptive capacity of the country.

5. **Project description:** The project will assess the present situation and make proposals for improvement of the aid co-ordination system by providing on-going administrative, financial and statistical advice and assistance at the central agency level.

6. **Expected impact:** The project should provide immediate assistance to enable the Government to organise and phase aid and technical assistance proposals. In the longer term it should facilitate monitoring of assistance.

7. **Project duration:** Five years.

8. **Estimated cost:** US$2,000,000 comprising:
Personnel -- $1,500,000;
Training assistance -- $200,000;
Equipment -- $300,000.

9. **Present external involvement:** None.

General Project Profile no. 3
NATIONAL CENSUS OF KAMPUCHEA

1. **Area/sector**: Population: demographic data.

2. **Location:** Phnom Penh with work in all parts of the country.

3. **Implementing agency**: To be defined.

4. **Objective and justification:** To establish a statistical service prior to undertaking a census of population in Kampuchea. No census has been undertaken in Kampuchea since 1962, and the country lacks reliable basic statistical information upon which to base plans, programmes and population projections. It would be appropriate to conduct the census in 1992, 30 years after the first census. To achieve this, a high priority should be accorded to the project.

5. **Project description:** The project will provide institutional support to the appropriate arm of Government to enable it to plan, organize, analyze and publish a national census in 1992. The project would take place in two interlocking process, the first of which would establish the institutional required to lay the ground-work for the census proper, and the second to carry out the census itself. Experts would be provided to assist in all aspects of this work and initiate training for enumerators and analysts. Data processing equipment and other equipment would also be provided, as well as fellowships.

6. **Expected impact**: Short-term - To provide a new population base-line for all Government planning purposes. Long-term - To create an on-going capability to undertake new population series on the basis of which future population data may be more securely.

7. **Project duration**: 4 to 5 years

8. **Estimated costs**: US$1.94 million (Phase I $450,000, Phase II $1.49 million), comprising
Personnel -- I $250,000, II $550,000;
Training -- I $50,000;
Equipment -- I $150,000; II $940,000.

9. **Present external involvement**: None

B. AGRICULTURE

Agriculture Project Profile no. 1
REBUILDING THE NATIONAL TECHNICAL ARCHIVES AND CREATION OF A MODERN DOCUMENTATION CENTRE

1. **Area/sector**: Agriculture/Technical training

2. **Location:** Chamcar Daung University, Ministry of Agriculture.

3. **Implementing agency:** Chamcar Daung University - Gret Ngo.

4. **Objective and justification:** After full destruction of all documents, and archives related to the period previous to 1975 the country had lost all its technical archives, a part of the nation's memory. It also applies to the technical books for in-service job or for teaching. As an example more than 20 years of agricultural research results are not available in the country and a part of this research will have to be redone if these documents cannot be found. Fortunately the institutes involved in this research still have copies in their own archives. Gret (a French NGO) has started gathering technical archives.

5. **Project description:** One organization will be in charge of locating, gathering, xeroxing, and shipping the documents. Most of the documents are in France (Consultancy Firms, Tropical Institutes, Ministere de la Cooperation), in FAO Rome, in Mekong Committee, in Cornell University, USA and in different countries. The same organization will be in charge of assisting the Khmer to collect the documents and books and to establish a documentation centre. The document centre will cover natural resources, agriculture, livestocks, fisheries, plantations and agroindustry.

6. **Project duration**: 2 to 3 years.

7. **Estimated cost**: Approximately US$200,000 comprising:
Training assistance -- Provision of a full-time consultancy in Europe, 6 months - $60,000:
Equipment -- Duplicating, packing and shipment of documents, $25,000; 3,000 books for the document centre, $45,000; books for students and in-service technicians, 3 years, $70,000.

Agriculture Project Profile no. 2
REINFORCEMENT OF EXTENSION SERVICES

1. **Area/sector:** Agriculture

2. **Location:** Extension services in each province.

3. **Implementing agency:** Department of Agronomy.

4. **Objective and justification:** Extension services are presently facing difficulties because of lack of vehicles. Also extension services are disseminating very few new methods. Several small improved farms could be at the same time demonstrative farms and training centres for the extensionists. These farms could be the basis for developing demonstration plots networks.

5. **Project description:** Supply of 12 4WD vehicles, 24 motorcycles, 36 cycles. Creation of 1 or 2 small improved farms in each populated province. Creation of a training centre in each populated province, one dormitory, one class room, a small laboratory and some material for extension. Providing technical assistance to assist extension services manager.

6. **Project duration:** 2 to 3 years.

7. **Estimated costs:** Approximately US$860,000 comprising:
Technical assistance -- $200,000;
Training -- 12 centres, $300,000;
Equipment -- 12 4wd vehicles including spare parts $180,000, 24 motorcycles and 36 cycles including spare parts $100,000, 24 small improved farms $74,000.

Agriculture Project Profile no. 3
REINFORCEMENT OF APPLIED RESEARCH

1. **Area/sector:** Agriculture/Research

2. **Location:**

3. **Implementing Agency:** Department of Agronomy.

4. **Objective and justification:** A programme of applied research would allow building an extension programme. It will cover different aspects as: 1) soil mechanized tillage; 2) improved draft cultivation see GRET NGO); 3) low-input rice farming; 4) green manure, cattle manure application; 5) deep water rice improvement (see IRRI); and 6) low fertilization on local variety etc. This reenforcement will consist in: 1) training technicians in IRRI Philippines, in ICRISAT, India etc.; 2) providing research expert assistance and 3) provision for the establishment of a stations (building, equipment, material).

5. **Project description:** The steps taken will be: a practical basic survey on applied research policy and content; a training programme; establishment of one station or two.

6. **Project duration:** 2 to 4 years.

7. **Estimated costs:** Approximately US$450,000 comprising:
Study on applied research policy -- $30,000;
Training -- 4 technicians a year, $110,000;
Establishment of 2 stations -- $ 40,000 plus 4 years operating costs $18,000;
Technical assistance -- 2 years, $200,000;
Equipment -- material, machinery, cattle $15,000, 2 vehicles, 2 motorcycles & spares $38,000.

Agriculture Project Profile no. 4
MANUFACTURING AND ASSEMBLING OF AGRICULTURAL MACHINERY AND HAND TOOLS

1. **Area/sector:** Agriculture/Manufacturing.

2. **Location:** Subject to further decisions.

3. **Implementing agency:** Ministry of Agriculture, Mechanization Department.

4. **Objective and justification:** Presently there is a need for agricultural machinery as thrashing machines, rice husks, agricultural implements for draft cultivation (sowers, weeders, metallic ploughs or harrows etc.) and for hand tools and devices. The first step is to investigate what are the real needs, what equipment is required and to which extent the machinery could be fully manufactured in the country or to be assembled. On the basis of this assessment a small-scale workshop, easily capable of extension will be set-up. It will be complementary to the on-going manufacturing.

5. **Project description:** Study to: 1) appraise what machinery or devices can be profitably manufactured in Kampuchea; 2) to look for lay-out available; 3) to design a manufacturing workshop, and if possible 4) to build prototypes. Setting up of a manufacturing workshop.

6. **Project duration:** Not known.

7. **Estimated cost:** Approximately US$700,000 comprising:
Study -- design of a workshop -- $ 30,000;
Establishment -- lay-out of machinery devices and prototypes $60,000, buildings $ 25,000;
Equipment -- vehicles (1 car, 1 truck) $22,000 other equipment and supplies $250,000;
Operating costs and provisions for 3 years -- $100,000;
Technical assistance -- 2 years $200,000.

Agriculture Project Profile no. 5
IDENTIFICATION OF SMALL PROCESSING UNITS

1. **Area/sector:** Agriculture/Small scale agroindustry

2. **Location:** All over the country.

3. **Implementing agency:** Ministry of Agriculture, Ministry of Industry, jointly.

4. **Objective and justification:** The installation of small processing unit, would promote the cash crop and as a result would increase farmers incomes. The processed products would bring more added value to the national economy. Some examples of small processing units: rice mills, animal feed mills, fish sauce packing or bottling, furniture workshops, a small mobile pasteurized fruit juice unit, a small sugar processing unit, cassava (gelatine) fruits, jam, etc.

5. **Project description:** Identification of on-going traditional processing or transformation; identification of small-size industrial unit; selection of the production with a good demand or possiblity of exporting; and
investigating of process and lay-out are available for small-size units.

6. **Project duration:** Not known.

7. **Estimated cost:** Approximately US$55,000 comprising:
Study -- 3 months $45,000;
Internal transportation -- $4,500;
Printing -- $5,000.

[See Section G below for other industrial projects related to agriculture]

C. LIVESTOCK

Livestock Project Profile no. 1

INTEGRATED COLD CHAIN FOR VACCINATION CAMPAIGN

1. **Area/sector:** Draft animals/livestock.

2. **Location:** The whole country /2 bases, one in Phnom Penh and one in Battambang.

3. **Implementing agency:** Animal Husbandry & Veterinary Department.

4. **Objective and justification:** As livestock population and ploughing capacity diminished during the 1970s, so did the area under cultivation. Some provinces, namely Battambang, Takeo and Prey Veng, are now drastically short of draft animals. Disease has also hampered livestock recovery or has debilitated existing animals. In most provinces, the vaccination rate is insufficient to keep livestock free of disease. Yet a nation-wide vaccination campaign, which would be required to increase the number of draft animals, is jeopardized by the lack of suitable refrigeration equipment for the transport and storage of vaccines. The same cold chain could be used for human vaccines and artificial insemination products.

5. **Project description:** A cold room and a small diagnosis lab, with generator back-up, will be set-up in Battambang. These facilities are already available in Phnom Penh. Both Phnom Penh and Battambang bases will be provided with two trucks, equipped with electric/gas refrigerators for vaccine transportation. Vaccinators will be trained by an expatriate veterinarian in vaccination and quick diagnostic techniques. Refrigerator technicians will be trained by an expatriate refrigeration expert. The expatriate veterinarian will organize the cold chain, training and help in the diagnostic lab.

6. **Expected impact:** By improving livestock health, the project would contribute greatly to the rapid recovery of draft animal populations which would in turn permit increased food production from more widespread cultivation.

7. **Project duration:** 2 years, more if necessary.

8. **Estimated cost:** Approximately US$540,000 comprising:
Technical assistance -- veterinarian, refrigeration expert $260,000;
Equipment -- four 4wd vehicles, refrigerators, spare parts, fuel and lubricant for 2 years $110,000, 24 motorcycles, spare parts, fuel, lubricant $32,000, 36 cold boxes, 24 solar power refrigerators, veterinary equipment $110,000, cold storage and small lab in Battambang $60,000.

9. **Present external involvement:** AFSC NGO, CWS and FAO.

Livestock Project Profile no. 2

VACCINE PRODUCTION UNIT/FACILITY FOR ARTIFICIAL INSEMINATION

1. **Area/sector:** Draft animals/Animal health.

2. **Location:** Phnom Penh, Central Veterinary Office.

3. **Implementing agency:** Animal Husbandry and Veterinary Department.

4. **Objective and justification:** Vaccine production unit aimed at: (1) avoiding vaccine shortages; (2) building national know-how; (3) helping to increase the rate of animal vaccination; and (4) increasing the number of draft animals. Facilities for artificial insemination aimed at increasing the number of draft animals by taking advantage of the cold chain facility in the country.

5. **Project description:** A vaccine production unit will be set up, taking into account present capabilities. The new capacity should meet the needs of the country for the vaccine. Technical assistance will be provided to train Khmer staff.

6. **Expected impact:** An integrated and consistent system including production, distribution through a cold chain, teaming would contribute to rapid recovery of draft animals and consequently to extend cultivated land. Build up a national know-how for these advanced techniques is also a very positive impact.

7. **Project duration:** 2 years, more if necessary.

8. **Estimated cost:** US$500,000
comprising:
Technical assistance -- 2 years $200,000;
Buildings -- $40,000;
Training -- abroad $ 20,000;
Equipment and supplies -- containerized equipment, provisions $150,000, raw materials for 5 years $100,000.

9. **Present involvement in the sector:** AFSC NGO.

Livestock Project Profile no. 3

DAIRY PROJECT

1. **Area/sector:** Food, livestock, agro-industry.

2. **Location:** Neighbourhood of Phnom Penh.

3. **Implementing agency:** Animal Husbandry and Veterinary Department and Ministry of Industry/Private entrepreneur.

4. **Objective and justification:** a) To develop agro-industry; b) to promote smallholders' cow ownership; c) to provide farmers in the area with daily incomes; d) to improve the diet of the urban population especially children; and e) to promote employment. The dairy unit will have a average daily capacity of 1,000 litres. At the beginning, milk powder will be used in order to reach full capacity. Production will consist of pasteurized milk, packed in 0,25l and 0,50l plastic bags (PREPACK System). Capacity could be extended simply by installing additional tanks. Also, some small additional equipment will make possible the production of yoghurt and fruit juice. The unit will include a cold room.

5. **Project description:** Location of the unit will be determined by 1) proximity to the production area, 2) proximity to Phnom Penh market and 3) power and drinking water facilities. The unit will consist of a 150 sq m building including a 10 sq m cold room housing cool tank storage, a pasteurization system, and packing and pressurized cleaning systems.

6. **Expected impact:** To develop (1) milk consumption; (2) city market-oriented agriculture; and (3) technical farmers skills.

7. **Project duration:** 1 year.

8. **Estimated cost:** Approximately US$325,000
comprising:
Technical assistance -- feasibility work $30,000, TA for starting up and several missions $30,000;
Training -- abroad $10,000;
Buildings, power and drinking water facilities $50,000;
Equipment and supplies -- installation $170,000, 1 car and 2 motorcycles $10,000;
Working capital $25,000.

Livestock Project Profile no. 4
ANIMAL FEED MILL

1. **Area/sector:** Livestock/Farmer cash activity/Agro-industry.

2. **Location:** Neighbourhood of Phnom Penh.

3. **Implementing agency:** Ministry of Agriculture, private sector.

4. **Objective and justification:** 1) to develop farmers' cash activities; 2) to improve diet of Phnom Penh population; 3) to develop an agro-industry sector; and 4) to develop modern raising of poultry and pigs.

5. **Project description:** Two trucks are needed to gather raw material and to market products in the region. Technical assistance will be needed for 6 months and for a preliminary survey.

6. **Expected impact:** To develop city market-oriented agriculture which would improve the living standards of the farmers together with technical farmer skills.

7. **Project duration:** 1 year

8. **Estimated cost:** Approximately US$270,000 comprising
Feasibility study -- $150,000;
Technical assistance -- $60,000;
Buildings $ 30,000;
Equipment -- $120,000 plus 2 trucks $40,000.

9. **Present external involvement:** None.

Livestock Project Profile no. 5
IN-SERVICE TRAINING IN IMPROVED METHODS OF ANIMAL HEALTH AND LIVESTOCK HUSBANDRY

1. **AREA/SECTOR:** Reinforcement of Veterinary & Animal Husbandry Department.

2. **Location:** All over the country/abroad.

3. **Implenting agency:** Veterinary and Animal Husbandry Department.

4. **Objective and justification:** Rebuilding and reinforcement of the veterinary and animal husbandry capability. The training addresses different sectors: 1) diagnostic techniques; 2) applied veterinary practices; 3) improved draft animal breeding; 4) natural and artificial manure production; 5) modern poultry and pig farms; and 6) vaccine production.

5. **Project description:** With the assistance of a technical assistant, a training programme will be developed: 1) in the country for training and new graduates; and 2) abroad for specific specialization. The programme will include organization of travel, accommodation, session schedules, etc.

6. **Project duration:** 2 to 3 years

7. **Estimated cost:** US$575,000 comprising:
Technical assistance -- $300,000;
Training -- abroad $250,000;
Equipment -- 1 vehicle $25,000.

8. **Present external involvement in the sector:** None.

D. FISHERIES

Fishery Project Profile no. 1

SUPPLY OF BASIC FISHING GEAR AND EQUIPMENT REENFORCEMENT OF FISHERY DEPARTMENT LOGISTICS

1. **Area/sector:** Food production/fisheries.

2. **Location:** Mostly Tonle Sap and Kompong-Som neighbourhood.

3. **Implementing agency:** Department of Fisheries.

4. **Objective and justification:** Fish are by far the most important source of protein in the Kampuchean diet. Both present low output (compared to the 1960s') and demographic increase have resulted in an important fall in per capita consumption. Among the important factors limiting fish catches, the lack of basic fishing gear and equipment can easily and quickly be overcome. Project objectives are to promote a short-term significant increase in fish catches to upgrade family diet (fresh water) and to increase export incomes (sea fisheries).

5. **Project description:** Supply of: basic fishing gear to professional and part-time fishermen including hooks, floats, and other items; nylon thread as raw materials to two fishing net factories; engines for fresh-water fishing boats, marine trawlers, and fisheries inspection boats; high-speed craft for marine fisheries inspection; and 4wd vehicles for Fisheries Department. Repair and rehabilitation of the existing net factories.

6. **Expected impact:** 1) Prompt recovery of fishery catchment; 2) protection of flooded forests.

7. **Project duration:** 2 years for equipment and 5 years for basic fishing gear.

8. **Estimated cost:** US$700,000 plus unappraised expenses (basic fishing gear and nylon thread for 5 years, and rehabilitation of two net factories), comprising
Equipment -- 20 5/10 HP engines and 10 20/30 HP engines $120,000, 6 high-speed marine inspection boats $180,000, 10 4wd vehicles and spares and 20 45/200 HP engines, $400,000.

Fishery Project Profile no. 2

ESTABLISHMENT OF APPLIED RESEARCH AND TRAINING IN FISHERIES AND FISH FARMING (FRESH WATER CONDITIONS)

1. **Area/sector:** Food Production/Fisheries.

2. **Location:** *Institut de Recherche Piscicole*, on National Road 5 (Phnom Penh - Battambang), km 9.

3. **Implementing agency:** Fisheries Department.

4. **Objective and justification:** An increase in fish production, will require, among other inputs, training of skilled technicians to support and advise fishermen; development of an applied research programme especially in fish farming; 3 years survey of the recent factors which have caused declines in Great Lake fish yields.

5. **Project description:** The 1957-created *Institut de Recherche Piscicole*, near Phnom Penh, will be upgraded and extended to become: a vocational training centre (about 15 trainees each year); a fish farming applied research section; a laboratory to support applied research and long programme and the 3 years survey, 3 technical assistants will be assigned. From 3 to 5 small model fishing farms including ricefield fishing will be set up in typical and appropriate eco systems in the country.

6. **Expected impact:** Building (1) a skilled technican team (2) a know-how in fish farming (3) the development of fish farm and rich fish (4) to further stop the deteriorating of fish producing related to Great Lake over flooded forest.

7. **Project duration:** 3-5 years

8. **Estimated cost:** Approximately US$4,250,000 comprising:
Technical assistance -- 3 years, $900,000;
Vocational training center, $50,000;
Laboratory, $400,000;
Equipment -- Four 4-wheel drive vehicles and spare parts $70,000, four small model fishing farms $25,000;
Operating costs -- five years $100,000.

9. **Present external involvement:** None.

Fishery Project Profile no. 3
AFFORESTATION OF FLOODED FOREST DREDGING OF MEKONG RIVER BANKS

1. **Area/sector:** Food Production/Fisheries.

2. **Location:** Tonle Sap area.

3. **Implementing agency:** Fisheries Department.

4. **Objective and justifications:** Main causes of the decline in Tonle Sap fish yields are clearing of the flooded forest and siltation of the Mekong at "quatre bras".

5. **Project description:** Replanting in the flooded forest will be progressively carried out with seedlings and/or cuttings. A preliminary survey is needed. The Mekong meanwhile has not been dredged for 15 years, so that the first dredging will last a long time. Dredging requires heavy equipment. The first heavy dredging should be undertaken by a dredging specialist. Technical assistance will be provided in order to select, order and inspect the heavy equipment; select dredging specialists and supervise their work; and train Khmer heavy equipment operators and Fisheries Department technicians. Future maintenance dredging will be undertaken by the Fisheries Department (company).

6. **Expected impact:** Replanting of flooded forest and restoration of the Tonle Sap *quatre bras* area will promote the rapid recovery of freshwater fisheries and will help to ensure that this essential ecosystem will be maintained.

7. **Project duration:** 2 years

8. **Estimated cost:** Approximately US$275,000 plus unappraised costs (seedling nurseries, technical assistance for dredging, heavy equipment, first-year dredging by internationsal contractors and yearly maintenance dredging), comprising
Preliminary study and supervision by a senior forest expert, $50,000;
Technical assistance -- 2 years $200,000;
Equipment -- 3 motor bikes $6000, one 4wd vehicle $19,000.

9. **Present external involvement:** Unknown.

E. FORESTRY

Forestry Project Profile no. 1
STRENGTHENING OF THE FORESTRY DEPARTMENT AND CREATION OF A FORESTRY STATION

1. **Area/sector:** Forest resources protection.

2. **Location:** Station located near important forested areas.
3. **Implementing agency:** Forestry Department.

4. **Objective and justification:** As (1) large portions of forest have been cleared; (2) forest fires and shifting cultivation are still common; and (3) commercial logging is increasing, for both export and processing, urgent steps must be taken to stop further forest deterioration.

5. **Project description:** The first step will consist of (1) an overall forest inventory (see Profile No. 2 above): (2) drafting national forestry regulations; (3) training forestry officers; (4) supplying 10 4wd vehicles and 20 motorcycles and (5) setting up a forestry station. The station will (1) develop applied research programmes and technician training programmes, (2) provide repair facilities, and(3) set up seedlings nurseries. Technical assistance will be provided under the project to help the Forestry Department in many fields such as inventory interpretation, design of a forestry protection and utilization policy. Drafting of national forestry regulations, and training programmes.

6. **Estimated impact:** To stop forest resources deterioration and encourage national use.

7. **Project duration:** 3 to 5 years.

8. **Estimated cost:** US$1,350,000 comprising
Technical assistance -- two experts for 3 years $600,000;
Equipment -- building $650,000, supplies $100,000.

9. **Present external involvement:** NGO Mennonite Central Committee involved in nurseries.

Forestry Project Profile no. 2
INVENTORY AND MONITORING OF KAMPUCHEA'S FOREST COVER

1. **Area/sector:** Forest resources protection.

2. **Location:** Whole country.

3. **Implementing agency:** Forestry Department.

4. **Objective and Justification:** To assess the Khmer Rouge destruction of forest cover; to determine and monitor trends of ongoing forest utilization; to map on a 1250,000 scale the present vegetation cover; and to establish a sound basis for adequate forest resources planning and management.

5. **Project description:** This project will be implemented through international and regional expertise. The study of forest cover will be based on the required analysis of a number of test sites, using ground truth, aerial photographs and satellite imagery.

6. **Project duration:** Inventory 2 years.

7. **Estimated cost:** Approximately US$465,000 comprising:
Technical assistance -- full-time consultants including travel $360,000;
Equipment -- operating costs, supply $80,000;
Reporting and printing -- $25,000.

F. MINERALS

Minerals Project Profile no. 1
UPDATED REVIEW OF MINERALS INFORMATION

1. **Area/sector:** Mining.

2. **Location:** Nation-wide.

3. **Implementing agency:** Ministry of Industry.

4. **Objective and Justification:** The objective is to indicate the feasibility of priority areas of mineral resources exploitation. The study is justified in terms of the eventual improvement in the living standards of local people employed in mine extraction projects and in terms of foreign exchange earned and/or saved.

5. **Project description:** A review of existing (pre 1975) literature would be undertaken by a mission, which would visit the country to reconnoitre, perhaps focussing on possibilities in Haut Chhlong (bauxite), Preah Vihear (gold), Pailin and Bokeo (gemstones), Battambang and Kampot limestone and clay for cement and the northeast for coal. The mission would also draw up project document(s) for a further project or projects designed to undertake further investigations of more promising prospects, and provide fellowships and equipment for the Ministry staff.

6. **Expected impact:** The study would recommend priorities for investment and means of implementation and administration which may lead to the more efficient use of energy, equipment and skilled human resources. This will have a more immediate impact and in the longer term the increased local and foreign income in this significant economic sector will have raised the natural standard of living.

7. **Project duration:** The study would take 3 months.

8. **Estimated cost:** The cost would be about US$100,000 for technical assistance, short-term training and support.

9. **Present external involvement:** None.

G. MANUFACTURING INDUSTRY

Industry Project Profile no. 1

ASSESSMENT OF STATE-OWNED INDUSTRIAL PLANT

1. **Area/sector**: Industry.

2. **Location**: Phnom Penh and provincial capitals.

3. **Implementing agency**: Ministry of Industry.

4. **Objective and justification**: Both the central Government and provincial authorities have inherited a large number of former private and State-owned industrial enterprises in various conditions ranging from fully operational to completely devastated. Some of them were never appropriate in scale or design to the country's needs and resources, while in others the once appropriate equipment is now obsolete. Many have been at least partially rehabilitated over the past decade, but economic criteria may not have been used to select these. Some which are not yet operating fully could do so without modifying the plant if/when demand and material supplies permit, but in most cases further investment would be needed to achieve optimal performance. A comprehensive assessment of the present and potential viability of the enterprises is required to facilitate Government decision-making on what actions should be considered for each of them. Such decisions may be needed on competition and other policy issues, ownership, further public investment and/or technical assistance.

5. **Project description**: The assessment should cover all manufacturing and industrial enterprises under the control of the Ministry of Industry, other sector Ministries and provincial authorities, which would employ 10 or more persons. Terms of reference for the assessment should include an annotated inventory of such enterprises, an estimate of the investment cost of major rehabilitation where possible and required, a provisional description of effective demand, estimates of both scrap and operating net present value, discussion of strategic factors such as employment and intersectoral linkages, and the establishment of a permanent monitoring system for public investment in manufacturing.

6. **Expected impact**: The assessment should provide the Government with the necessary basis to determine strategy for its investment in each enterprise, including negotiation with prospective buyers or partners, commissioning feasibility studies on rehabilitation, and planning appropriate infrastructural and other support. This should facilitate improved efficiency and equitable terms for the entry of private capital.

7. **Duration**: Experts in industry economics, engineering and finance, with Ministry counterparts, should require three months for the assessment.

8. **Estimated cost**: US$128,000 comprising:
Technical assistance -- 9 man-months @ $400/day average fee and $40/day subsistence, plus airfares, totalling $117,000;
Training -- on-the-job;
Supplies and equipment -- fuel, communications, miscellaneous $3000, one computer with suitable software and peripherals (to remain with Ministry of Industry) $8000. (The Ministry would provide the use of one 4wd vehicle received under another project.)

9. **Present external involvement**: No assistance is being provided to industry planning.

Industry Project Profile no. 2
AGRO-INDUSTRY PRE-FEASIBILITY STUDIES

1. **Area/sector**: Agriculture, Industry

2. **Location:** Phnom Penh and selected provincial capitals and farming locations.

3. **Implementing agencies:** Ministries of Agriculture and Industry, jointly.

4. **Objective and Justification:** Development of agro-processing is desirable to provide a market -- including potential export --for diversified agriculture and thus improve cash incomes for many of the country's full and part-time farmers, who comprise most of the population. In some cases, where the supply/demand and technology situations are unclear, pre-feasibility assessments are required before specific crop promotion programmes or processing investment projects can be defined and subjected to feasibility study. The immediate objectives of this project are: (1) to begin the establishment of Government capacity for making assessments which must involve both agricultural and industrial considerations at the pre-feasibility stage, (2) to undertake several such assessments on potential new or expanded activities the prospects for which seem good but are subject to economic and technical conditions that need careful analysis, and (3) to provide on-the-job training for Ministry officials in pre-feasibility methodology. These are steps towards the longer-term goals for raising farm incomes, adding value through further processing, and diversifying exports.

5. **Project description:** The project should comprise concurrent pre-feasibility studies of at least three product groups which share the need to explore the scope for both growing (by smallholders and/or commercial farms) and processing (by new or rehabilitated plant). The first three studies should deal with:

(a) sugar -- expansion of cane growing and either complete rehabilitation of the 15,000 tpy Kompong Kol refinery or establishment of smaller local refineries;

(b) fruit juice -- expansion of orange and other fruit growing and rehabilitation of the SKD juice plant, including its export potential; and

(c) vegetable oil, starch and/or animal feed -- expansion of the production of oil seeds (castor, kapok, rubber fruit etc.) and other oil crops (especially coconut and corn), and either (1) the establishment of medium/large-scale multi-product processing and refining capacity or (2) the improvement and replication of several existing oil and animal feed plants and the establishment of a starch plant.

Other possibilities include jute, paper, and vegetables.

6. **Expected impact:** The project should provide the Government with an objective basis for making two types of decision -- (1) whether to proceed with more detailed planning and feasibility analysis, and (2) whether and in what form to invite private participation -- in several potentially important agro-industries. It should also strengthen the technical capacity of the two main Ministries concerned to undertake multi-disciplinary pre-feasibility analysis.

7. **Duration:** A team of five (e.g. 1 industry economist, 1 industry engineer, 1 fruit/sugar agronomist, 1 oilseeds/corn agronomist, 1 food process specialist), plus one more person for each additional study which could be included in the project, working in cooperation with Ministry and provincial officials, should do the studies in 2.5 months.

8. **Estimated cost**: US$135,000 to 185,000 (for three to five studies) comprising:
Technical assistance -- 9 to 13 man-months at $375/day average fee plus $40/day subsistence, plus airfares, totalling $116,000 to 166,000;
Training -- on-the-job;
Supplies and equipment -- fuel, communications and miscellaneous $5000, two computers with suitable software and peripherals, to be left with the Ministries, $14,000. (The use of vehicles should be provided by Agriculture and Industry)

9. **Present external involvement:** USSR and GDR have helped restore rubber plantations; MCC and CIDSE have helped oil seed cultivation and processing.

Industry Project Profile no. 3
TEXTILE SUBSECTOR STUDY AND PRE-FEASIBILITY ANALYSIS FOR AN INTEGRATED TEXTILE MILL

1. **Area/sector:** Industry.

2. **Location:** Phnom Penh, Battambang and Kompong Cham.

3. **Implementing agency:** Ministry of Industry (Planning Department).

4. **Objective and justification:** Although the country's existing textile production capacity is greater and in better condition than that of most other industries, there may be scope for either (1) a major rehabilitation programme or (2) the establishment of a modern integrated mill in addition to the minor upgrading of some of the old factories. A principal objective of the study would be to determine such scope, the appropriate range of operations, and optimal scale. These considerations would need to take into account the alternative approach of undertaking a major programme to upgrade, expand and perhaps divest the existing State units, thus serving the study's other principal objective: to provide an overview of the whole subsector's prospects and constraints, including rehabilitation needs -- with and without a new mill. As this could be the first major study of its type to be undertaken in the industry sector, a third key objective would be to strengthen the Ministry of Industry's technical capability in this regard.

5. **Project description:** The subsector-cum-prefeasibility study would be undertaken for the Ministry of Industry by a team of three experts, working closely with MOI planning department officials to be trained on-the-job. Its terms of reference should include: assessment of existing textile facilities; costing the major and minor rehabilitation and reorganization options for them; quantity and cost projections of domestic short and long-fibre cotton supply, and world price projections for cotton and synthetic fibre and yarn; review of alternative available technologies; estimates of fixed and variable production costs of different configurations for a new integrated facility; domestic and export demand projections, including potential demand for cloth from a commercial garment making industry; comparison of the potential net benefits of establishing a new mill with those of a major rehabilitation programme and, if a new mill appears a viable option, review of possible ownership structures and draft terms of reference for a feasibility study.

6. **Expected impact:** As an essential first step involving careful economic and technical analysis in a process of subsector reorganization, the study's impact on development would be indirect but important. It should stimulate progress on improving and expanding efficient capacity in the textile subsector, while at the same time it should help avoid mistakes in programming these developments, in determining the policy environment to encourage them, and/or in negotiating with potential foreign or domestic private participants.

7. **Duration:** The proposed team of an industry economist, a textile engineer and a financial analyst, with substantive inputs from two Ministry counterparts assigned full-time and from Textile Combinat management, should be able to complete the project within two months.

8. **Estimated cost:** US$70,000 comprising:
Technical assistance -- 5 man-months at $375/day average fee and $40/day subsistence, plus airfares, totalling $65,000;
Training -- on-the-job, but expenses of counterpart staff $3000;
Supplies and equipment -- fuel, communications and miscellaneous $2000. (The Ministry should make available a computer received under another project and one vehicle).

9. **Present external involvement:** The existing facilities at Battambang and Kompong Cham have been assisted by CIDSE and Oxfam respectively; the Combinat's unit no. 5 has had help from WCC.

Industry Project Profile no. 4

COMPREHENSIVE ASSISTANCE FOR WOOD PROCESSING

1. **Area/sector:** Industry (wood processing, pulp and paper), Forestry, International trade.

2. **Location:** Phnom Penh and throughout forested areas.

3. **Implementing agency:** Ministry of Industry (Planning and Provincial Industry Departments) jointly with Ministry of Agriculture (Forestry and Wildlife Department), or an inter-departmental group to be formed by these and other agencies to coordinate forest-based industry and commerce.

4. **Objective and justification:** Forest-based industries ought to comprise one of the country's major sources of value added in efficient import substitution and export proceeds. To enable these benefits to be attained quickly and sustained over the long term, however, there is an urgent need for governmental intervention and assistance in several aspects of forestry management, log and lumber exploitation, and further processing in industries such as pulp and paper, furniture and joinery products, and artisanal carving. The objective of the project is to address the issues concerned in an integrated manner, by undertaking technical and economic research, planning, training and/or advisory services as required in the several production stages. It should thus provide a comprehensive framework for further steps to build on the initiatives which the Government has taken on some aspects of the forestry sector, and should strengthen the technical capability of the government departments concerned to develop and implement well coordinated forestry, industry and trade policies. In addition, it should complement a proposed concurrent project (see Forestry Project Profile no. 2) which is to be implemented by the Forestry Department and focussed more sharply on technical aspects of forest management and afforestation. (Alternatively, the two projects could be combined.)

5. **Project description:** The project's main activity would comprise various forms of specialized technical assistance to an inter-departmental group and also directly to public and private commercial enterprises engaged in logging, saw-milling and downstream processing activities.

Its several components would include:

- a survey of species suitable for various forms of utilization, to be conducted in cooperation with the proposed forest inventory;
- techno-economic analysis of competing and complementary uses of land which involve some form of existing or potential forestry;
- survey and profile of entities and species representing present and prospective demand for wood for fuel, construction, pulp making, domestic and export furniture, furniture parts and joinery, artisanal carving, etc.;
- formulation of a national forest resources conservation and exploitation (FORCE) programme which would outline objectives, projections, conservation control and incentive measures, investment and trade promotion strategies and technical support services;
- preparation of detailed guidelines for some elements of the programme such as sawmill registration criteria, identification of reserved species, standard royalty agreements. etc.;
- provision of technical assistance (advisory service and training as appropriate) to existing small-and medium-scale wood processors in fields such as equipment purchase and maintenance, timber selection, storage and treatment, basic and specialized carpentry and cabinet making techniques, workshop practice, book-keeping, design for export markets, etc.;
- establishment of a State, mixed or cooperative enterprise to offer such services on a continuing basis and to act as a specialized standards organization and export agency for small producers; and
- preparation of a prefeasibility study on large scale pulp and paper production.

In addition to these eight technical assistance components, the project would include:

- the provision of equipment and supplies such as wood treatment plant and chemicals, specialized tools, etc. which the Government would sell cheaply to workshops to encourage the adoption of improved techniques; and

- the arrangement and funding of study tours, attachments and formal training abroad for forest and wood industry administrators and staff of private enterprises.

6. **Expected impact:** The project should not only provide a solid basis for the ecologically and economically sound exploitation of forest resources over the long-term, but also assist the making of immediate decisions on public policy, public and private investments, and the operations of several existing wood-based industries. It should thus contribute to significant foreign exchange earning and saving, generation of new employment opportunities, and diversification of the economy.

7. **Duration:** Two years by a core team of two plus several short-term specialists.

8. **Estimated cost:** US$800,000 comprising:
Technical assistance -- 60 man-months @ $300/day avg fee plus $40/day subsistence plus airfares, totalling $555,000;
Training -- $100,000;
Supplies and equipment -- inputs and plant for demonstrating new technologies etc. $137,000, fuel, communications and miscellaneous $8,000.

9. **Present external involvement:** JANGOO has helped some small processors and AFSC some sawmills. The Government may discuss restoration of its plywood plant with Czech and/or Japanese entities.

[See also Sections B and C above and R below for agricultural, livestock and health projects relating to industry.]

H. WATER RESOURCES

Water Project Profile no. 1

PROVISION OF TECHNICAL ASSISTANCE, MACHINERY AND SURVEY EQUIPMENT TO THE DEPARTMENT OF HYDROLOGY

1. **Area/sector:** Water resources.

2. **Location:** Takeo, Kandal, Prey Veng, Svay Rieng.

3. **Implementing agency:** Ministry of Agriculture, Department of Hydrology.

4. **Objective and justification:** Six on-going irrigation projects in four provinces need technical assistance and equipment. This will allow the projects to continue under specialist guidance. The equipment will improve the Department's performance in the maintenance of irrigation canals.

5. **Project description:** Three engineers and a mechanic will join the Department and continue on-going assistance in planning, design, surveys and equipment maintenance. Some additional survey items, vehicles and motorgraders will be provided.

6. **Expected impact:** A build-up of confidence and practical skills in the local engineers and technicians to work with minimal guidance. Eventually the Department will not require external assistance.

7. **Project duration:** Three years.

8. **Estimated cost:** US$1,900,000 comprising:
Technical assistance -- $1,200,000;
Equipment -- $700,000.

9. **Present external involvement:** This is an on-going NGO project.

Water Project Profile no. 2
REHABILITATION OF THE HYDRO-METEOROLOGICAL NETWORK

1. **Area/sector:** Natural resource development.

2. **Location:** Whole country.

3. **Implementing agency:** Department of Hydrology, Ministry of Agriculture.

4. **Objective and justification:** To rehabilitate the priority hydro-meteorological stations in order to re-establish a network of stations in the country.

5. **Project description:** The project will rehabilitate 30 hydrologic stations, 80 rainfall stations and 10 evaporation stations. It will include training of the technical personnel who will carry out the concerned activities and the operation of hydro-meteorological stations.

6. **Expected impact:** Upon completion of the project the hydro-meteorological network will be firmly re-established with qualified technical personnel to operate the network's stations.

7. **Project duration:** 5 years.

8. **Estimated cost:** US$ 1.4 million comprising:
Technical assistance -- $800,000;
Training -- $200,000;
Equipment -- $400,000.

9. **Present external involvement:** An NGO is providing some of the equipment and training.

Water Project Profile no. 3
BOVEL IRRIGATION

1. **Area/sector:** Water resources/irrigation.

2. **Location:** Right bank of the Stung Mongkol Borey, northwest of Battambang.

3. **Implementing agency:** Ministry of Agriculture.

4. **Objective and justification:** The existing 30,000 ha wet season irrigation scheme is to be expanded to 45,000 ha plus 10,000 ha dry season irrigation by means of a new storage reservoir. This will enable greatly increased production.

5. **Project description:** The irrigation works were initiated in 1926 and the head-work (Bovel diversion dam) at Stung Mongkol Borey was completed in 1968 for 30,000 ha irrigation. Two dams, each 12 m high and with total effective storage of 142 million cubic m, are planned for the upper reaches of the Stung Mongkol Borey to increase irrigation.

6. **Expected impact:** A feasibility study (1974) under the pioneer agricultural development scheme of the Mekong Committee identified the benefit from 5,000 ha as some 3 t/ha paddy yield. Since the project is located in the Battambang plain, a national granary, the project will play an important role in increasing food production.

7. **Project duration:** Total 3.5 years consisting of the feasibility study and design 2 years and construction 1.5 years.

8. **Estimated cost:** US$67 million comprising:
Technical assistance -- $3.7 million;
Equipment, materials, fuel -- $32.0 million;
Training -- $ 0.3 million.
Local contributions about $31 million.

9. **Present external involvement:** None.

Water Project Profile no. 4
STUNG CHINIT MULTIPURPOSE

1. **Area/sector:** Water resources/Irrigation and hydropower.

2. **Location:** Area along the Stung Chinit centering on Kompong Thma, Kompong Thom province.

3. **Implementing agency:** Ministry of Agriculture.

4. **Objective and justification:** To develop 25,400 ha irrigation area by means of storage on the Stung Chinit (Phnom Takho multi-purpose dam), 4.5 MW hydropower station, 2.0MW pumping station and irrigation network. A feasibility study endorsed by the Mekong Committee in 1971 showed that the project is economically viable.

5. **Project description:** The project was identified by a Mekong Secretariat team in 1967 (a reconnaissance survey for the northern area of the Great Lake). Feasibility study was carried out by a Japanese team during 1968 and 1969. Irrigarion area (25,400ha) is divided into three blocks but can be constructed in a single stage. Ancillary benefits will include power (for pumps and rural electrification), fishery and flood control (polder dike and drainage pump near the Tonle Sap).

6. **Expected impact:** Annual project benefits are estimated at US$6.4 million for irrigation, US$1.4 million for power generation and smaller amounts for flood control and fisheries. For the longer term, similar projects located on tributaries around the Great Lake could follow.

7. **Project duration:** Appraisal study 1 year, design 2 years and construction 3 years, total 6 years.

8. **Estimated cost:** US$86.5 million comprising:
Technical assistance -- $4.2 million;
Equipment, materials, fuel -- $42.0 million;
Training -- $ 0.3 million;
Local contributions about $40 million value.

9 **Present external involvement:** None.

Water Project Profile no. 5
BATTAMBANG IRRIGATION

1. **Area/sector:** Irrigation/Hydropower.

2. **Location:** Battambang Province.

3. **Implementing Agency:** Ministry of Agriculture, Department of Hydrology, Ministry of Industry, Mekong Committee.

4. **Objective and justification:** To use the Stung Battambang site primarily to provide for irrigation in this fertile province, and also for power production. Justification: Estimated annual irrigation, power and flood control benefits from Phases I and II are US$26 million at 1989 prices.

5. **Project description:** The project includes construction of a diversion weir, a storage dam, a 24 MW hydropower station and 68,000 ha irrigated area, which can be constructed in three phases.

6. **Expected impact:** Investment for construction can be expected to have a significant short-term effect on the province. In the longer term, irrigation and power supply will benefit the whole country in terms of food self-sufficiency and possible energy exports.

7. **Project duration:** 1 year for planning and a further 3 years for design. Construction of the first two stages would take another 5 years.

8. **Estimated cost:** US$365.0 million comprising planning and design for Phases I and II $5.3m; construction $360m. This can be separated into:
Technical assistance -- $9 million;
Equipment and material -- $350 million;
Training and labour -- $6 million.

9. **Present external involvement:** The Mekong Committee can be expected to follow up this project with further input into power distribution, and full on-farm development of irrigation.

Water Project Profile no. 6
PREK THNOT MULTIPURPOSE

1. **Area/sector:** Irrigation/Hydropower.

2. **Location:** Kompong Speu Province.

3. **Implementing agencies:** Ministry of Agriculture (Department of Hydrology); Ministry of Energy; Mekong Committee.

4. **Objective and Justification:** To restart this multi-purpose project, begun in the 1960s, for irrigation, power and flood control. The 1988 Australian report estimates project internal rate of return to be 11-12 per cent.

5. **Project duration:** The dam, which would provide regulation and storage, will be located on the Prek Thnot river, 70 km west of Phnom Penh. The existing diversion weir, located about 12 km downstream from the dam, would divert water into the irrigation area, which will eventurally total 70,000 ha.

6. **Expected impact:** Investment for construction can be expected to have a significant short-term effect on the province. In the longer term, irrigation and power supply will benefit the whole country in terms of food self-sufficiency and possible power exports.

7. **Project duration:** 1 year for re-appraisal and a further 4 years for documentation, fund-raising and construction.

8. **Estimated cost:** US$99.7 million comprising: construction of the dam and irrigation outlets $68m, power station and associated facilities $31m, and re-appraisal study $700,000. The total can be separated into
Technical assistance -- $ 2 million;
Equipment and materials -- $95 million;
Training and labour -- $3 million.

9. **Present external involvement:** An NGO is arranging to do the re-appraisal study.

Water Project Profile no. 7
PILOT SCHEME FOR GROUND-WATER DEVELOPMENT

1. **Area/sector:** Water resources/Water supply including irrigation.

2. **Location:** Pilot schemes in provinces of Kandal, Takeo, Kampot, Prey Veng, Svay Rieng.

3. **Implementing agency:** Min. of Agriculture.

4. **Objective and justification:** Shallow wells almost everywhere are the main source of drinking water for Khmer farmers. Southern provinces along the Mekong and its distributary, where inundation takes place annually but abundant ground-water exists in sand aquifers. A pilot scheme of deep-well and pumping supply for village water and cash-crop irrigation may be profitable and economically justified. Surface water in the dry season is scarce, very far away and of inferior quality in general.

5. **Project description:** Collection of geo-hydrological information and selection of five pilot scheme locations; digging of 25-40 m deep wells with casing and protection frame, some 15 wells for 30 ha at one pilot scheme in each of the five provinces (total 75 wells for 150 ha); pumping test of yield and planning/ design of water supply and development or construction of the water supply system; and monitoring of the wells - water use and its effects, geo-hydrological data, etc.

6. **Expected impact:** Pilot scheme in each one of the five provinces will prove the viability of the common use of ground-water by some 20 farmers' households. With monitoring, the scheme will be improved and further expanded to other areas in the province.

7. **Project duration:** One year for implementation and another year for monitoring.

8. **Estimated cost:** US$800,000 comprising:
Technical assistance -- $150,000;
Training -- $50,000;
Equipment and materials -- $600,000.

9. **Present external involvement:** NGOs have helped construct deep wells mainly for hospitals and dispensaries, e.g. OXFAM/JVC in Takeo.

I. ENERGY

Energy Project Profile no. 1

CONFIRMATION OF OIL AND GAS DEPOSITS

1. **Area/sector:** Energy production/industry.

2. **Location:** Countryside and territorial waters.

3. **Implementing agency:** Ministry of Industry.

4. **Objective and justification:** To appraise all previous studies and exploration in order to determine the next appropriate activity. Kampuchea is at present fully dependent on imported oil. The use of domestic oil and gas would save foreign exchange.

5. **Project description:** Expertise in oil and gas exploration is required to locate and study all information which can be obtained regarding previous exploration actvities. The results will be a document summarising previous results and making recommendations as to further work required.

6. **Expected impact:** A quick understanding of the probability of finding viable deposits. In the longer term transfer of technology in exploration techniques. The development of favourable oil and gas deposits would markedly improve Kampuchea's economy.

7. **Project duration:** 4 months.

8. **Estimated cost:** US$200,000 (technical assistance)

9. **Present external involvement:** None.

Energy Project Profile no. 2

MICRO-HYDROPOWER STATION RECONNAISSANCE STUDY

1. **Area/sector:** Hydro-power.

2. **Location:** Nation-wide.

3. **Implementing agency:** Department of Hydrology, Mekong committee.

4. **Objective and justification:** The objective is to provide electricity for smallscale industry and housing in remote locations, by utilizing locally available water resources for micro-hydropower stations. Provision of electricity to remote locations is justificable chiefly in social terms of higher living standards for disadvantaged communities.

5. **Project description:** A reconnaissance study would identify suitable locations and costs for such stations, appropriate designs and equipment, and recommend a national programme for implementation.

6. **Expected impact:** The project would provide a national plan and training that would enable Khmer technicians to implement the micro-hydro programme. such a programme would eventually have significant impact on the standard of living of remote communities.

7. **Project duration:** The reconnaissance study should take 8 months.

8. **Estimated cost:** The total cost is estimated at US$150,000 consisting of US$120,000 for technical assistance and travel and US$30,000 for training.

9. **Present external involvement:** None.

Energy Project Profile no. 3
PREK THNOT MICRO-HYDRO

1. **Area/sector:** Hydro-power/Agriculture.

2. **Location:** Prek Thnot Diversion Weir, Kompong Speu Province.

3. **Implementing agency:** Department of Hydrology, Kampuchean National Mekong Committee.

4. **Objective and justification:** The production of power for electrification of nearby villages. The project is justified by a high economic return as the cost of civil works is considerably reduced due to the existence of a dam.

5. **Project description:** A diversion dam for the Prek Thnot project was substantially completed in 1973. Rehabilitation and completion of the whole project could take several years but installation of a 600 kW micro-hydropower station would have a more immediate impact.

6. **Expected impact:** Hydro-power electrification of nearby villages would considerably raise the standard of living.

7. **Project duration:** Three years.

8. **Estimated cost:** US$700,000 comprising:
Technical assistance -- $50,000;
Equipment -- $600,000;
Training and labour -- $50,000.

9. **Present external involvement:** An NGO is arranging a re-appraisal study of the Prek Thnot project.

Energy Project Profile no. 4
PHNOM PENH PERIMETER LINE RE-APPRAISAL

1. **Area/sector:** Energy production.

2. **Location:** Phnom Penh.

3. **Implementing agency:** Ministry of Industry.

4. **Objective and justification:** To improve the reliability of electricity supply by securely connecting the power stations. Phnom Penh is supplied by four power stations. These are not linked together reliably. When one has to be shut down the others cannot take the load because of the small capacity of the inter-connecting power lines. The perimeter line will also connect to future generation centres outside Phnom Penh.

5. **Project description:** Re-assess the 1972 ADB-financed project to build this line. Assess the present power situation and the plans for inter-connection with Prek Thnot, Kirirom, Kamchay, Kompong Som and the Great Lake area. Design an appropriate perimeter line. Training of counterpart staff.

6. **Expected impact:** More reliable power supply, more flexibility in meeting demands for increased power.

7. **Project duration:** 9 months.

8. **Estimated cost:** US$270,000 comprising:
Technical assistance -- $250,000;
Training -- $20,000.

9. **Present external involvement:** An NGO is arranging a brief power survey as part of the Prek thnot re-appraisal study.

Energy Project Profile no. 5

EMERGENCY REPAIRS TO PHNOM PENH ELECTRIC POWER SUPPLY - ASSESSMENT

1. **Area/sector:** Energy production.

2. **Location:** Phnom Penh.

3. **Implementing agency:** Ministry of Industry.

4. **Objective and justification:** To report on the present state of the power supply system so that urgent measures can be taken to improve it. Some generators are not operable for the lack of spare parts. Some of the "compact groups" generators should be replaced.

5. **Project description:** Power plant inspectors, familiar with GM, Sulzer and Worthington machines will inspect the stations and the distribution system, decide on the appropriate action, and prepare list of equipment, materials, spare parts and tools which are urgently required. Technical training of counterparts.

6. **Expected impact:** The study will lead the way for a quick improvement in the power supply situation.

7. **Project duration:** 2 months.

8. **Estimated cost:** US$100,000 (technical assistance).

9. **Present external involvement:** An NGO is arranging a brief review included in the Prek Thnot Re-appraisal.

J. TRANSPORT

Transport Project Profile no. 1

STUDY TO DETERMINE RECONSTRUCTION PROGRAMME FOR THE TRANSPORT SECTOR

1. **Area/sector:** Transport and communications technical assistance, transport study.

2. **Location:** Whole country.

3. **Implementing agency:** Planning Department, Ministry of Transport, Communications and posts.

4. **Objective and justification:** The country's transport infrastructure was seriously damaged during hostilities especially in the yearly 1970s. Since 1979, efforts have been made to rehabilitate it. However, continuing hostilities, shortage of funds, equipment and materials, as well as lack of skills, have hampered the work. In order to commence extensive and regular reconstruction, an initial study is required to establish reconstruction, an initial study is required to establish a basic development programme for the sector.

5. **Project description:** If agreed to by authorities in Phnom Penh, consultants should produce a basic infrastructure inventory, review physical and organizational reconstruction capabilities, and recommend an optimal reconstruction and development programme.

6. **Expected impact:** To identify immediately current bottlenecks in the transport infrastructure, and secondly, to establish a phased overall rehabilitation programme.

7. **Project duration:** 8 months.

8. **Estimated cost:** US$420,000 comprising:
Technical assistance -- $380,000;
Other expenditures -- $40,000.

9. **Present external involvement:** Co-ordination with present technical aid, if any. Further bilateral or multilateral grant required.

Transport Project Profile no. 2

STRENGTHENING THE PLANNING AND MANAGEMENT CAPABILITY OF MINISTRY OF TRANSPORT, COMMUNICATIONS AND POSTS

1. **Area/sector:** Transport and Communications/Technical assistance, development of expertise.

2. **Location:** Ministry of Transport, Communications and Posts.

3. **Implementing agency:** Ministry of Transport, Communications and Posts.

4. **Objective and justification:** The country's transport and communications system was seriously damaged during the early 1970s and it deteriorated further due to lack of proper maintenance and management. Many skilled and experienced staff were killed or fled the country. Although reconstruction efforts, have been made since 1979, these have been hampered by shortages of funds, labour and equipment, as well as a lack of skilled personnel and continuing hostilities. The technical assistance would therefore aim in particular to strengthen the Ministry's capacities in planning, policy making and management.

5. **Project description:** If authorities in Phnom Penh agree, 24 experts will be required: 4 for Planning Department, 2 for Finance, 2 for Water transport, 2 for Posts and telecommunications, 2 for Phnom Penh port, 2 for Kompong Som port, 2 for Shipping company, 4 for Roads and bridges, 2 for Railways, and 2 for Transport.

6. **Expected impact:** First, to strengthen the capabilities of the respective departments in identifying existing problems, and second, to institutionalize capabilities within the Ministry to implement current and future sectoral development plans with particular attention to training.

7. **Project duration:** 36 months.

8. **Estimated cost:** US$13.2 million

9. **Present external involvement:** Co-ordination with present technical aid required. Further bilateral grant required.

K. ROADS

Roads Project Profile no. 1

MASTER PLAN FOR REHABILITATING NATIONAL/PROVINCIAL HIGHWAYS

1. **Area/Sector:** Transport and Communications /Technical assistance, Roads and bridges study.

2. **Location:** Whole country.

3. **Implementing agency:** Planning Department, Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** Some 60 per cent of the country's 4,200 km of national highway and 10 per cent of its 1,700 km of provincial highway were paved with bituminous materials before 1960s. However these roads were seriously damaged during hostilities especially during the early 1970s and deteriorated further due to lack of maintenance. Since 1979, efforts to rehabilitate the roads have been hampered by lack of funds, equipment, materials and skills and continued hostilities. A master plan, after establishing in detail the current condition of all roads and bridges, would propose the phased current and future development of the necessary facilities.

5. **Project description:** Consultants should: conduct a reconnaissance of national highways and main provincial roads; develop an inventory of roads, bridge and ferry structures; propose appropriate maintenance systems; recommend institutional improvements with particular attention to training; and establish a phased development programme for the sector.

6. **Expected impact:** To develop a phased plan for development of the sector infrastructure.

7. **Project duration:** 6 months.

8. **Estimated cost:** US$310,000 comprising:
Technical assistance -- $250,000;
Subcontracts $40,000;
Other expenditure $20,000.

9. **Present external involvement:** Co-ordination with present technical aid required. Further bilateral or multilateral grant required.

Roads Project Profile no. 2

PROVISION OF ROAD AND BRIDGE CONSTRUCTION EQUIPMENT, VEHICLES AND MATERIALS

1. **Area/sector:** Transport and Communications/Capital assistance, provision of equipment.

2. **Location:** Whole country.

3. **Implementing agency:** Department of Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** Under the supervision of the Department, two autonomous financed divisions (a road construction company and a bridge construction company) and five other maintenance brigades, have in 1979-88 macadamized some 800 km of highways and urban streets, gravelled some 500 km of roads, upgraded and repaired some 700 km of bridges, and built some 500 m of new bridges. Although it will be required to study in depth physical capability possessed by the companies, this project aims to upgrade the capacity of these units through the provision of equipment, vehicles and materials, and also appropriate training facilities.

5. **Project description:** Supply of: construction equipment, vehicles and materials for the road and bridge construction companies; optimal sized equipment for the quarry company; maintenance equipment, vehicles and materials for four road maintenance brigades; training facilities including the services of two external training experts for 6 months for the training brigades; repair and maintenance facilities for the heavy equipment workshops.

6. **Expected impact:** To strengthen the capabilities of the relevant units of the Department, and to establish a coherent system of road rehabilitation and maintenance.

7. **Project duration:** 12 months.

8. **Estimated costs:** US$6 million (first phase).

9. **Present external involvement:** Co-ordination with the USSR required. Bilateral grant or multilateral concessional loan required.

Roads Project Profile no. 3

REHABILITATION OF CHROY CHANG VAU BRIDGES

1. **Area/sector:** Transport and Communications /Capital assistance, bridge.

2. **Location:** Phnom Penh municipality.

3. **Implementing agency:** Department of Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** To rehabilitate Chroy Chang bridge which was partially destroyed during the hostilities in 1973. Restoration of the bridge will give access to National Highways RN6 and RN7 which lead towards Siem Reap (Angkor Wat) and other principal cities to the north of the Great Lake and Kompong Cham and the rubber plantations there.

5. **Project description:** The 876 m bridge was completed in 1964 with financial assistance from Japan. In 1973, the three central spans totalling some 265 m were blown up. If agreed to by authorities in Phnom Penh, anticipated works will therefore be:

- reconstruction of the three spans using continuous steel box girders;
- reconstruction of concrete piers;
- removal of underwater obstacles;
- reconstruction of approaches.

6. **Expected impact:** Removal of the underwater obstacles will free navigation around Phnom Penh Port, the project will create local employment opportunities, and travel times between Phnom Penh and the cities of the northwest will be greatly reduced with consequent benefits for tourism and the domestic economy.

7. **Project duration:** 24 months.

8. **Estimated cost:** construction US$18 million.

9. **Present external involvement:** None, Bilateral or multilateral grant required.

Roads Project Profile no. 4

RECONSTRUCTION OF 50 KM OF POIPET-SEREI SOPHON SECTION OF NATIONAL HIGHWAY RN5

1. **Area/sector:** Transport and Communications /Capital assistance, Road Reconstruction.

2. **Location:** Thai border (Poipet) to Serei Sophon on RN5.

3. **Implementing agency:** Department of Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** RN5, running to the south of the Great Lake, is the most direct link between the Thai border, Phnom Penh and the principal cities in between. It once had a two-lane 405 m wide paved carriage way. This has largely deteriorated due to decades of little or no maintenance. It has been severely damaged by hostilities in recent years. The 50 km stretch of road can re-establish an important corridor for large quantities of trade and international aid.

5. **Project description:** If agreed to by the authorities, procurement of international consultants for detailed design and construction supervision, and of international contractors to rebuild the road will be proposed.

6. **Expected impact:** The construction work creates opportunities of local employment. The project would enable cross-border transport of aid and other international cargos and would make such sites as Angkor Wat more assessible to tourists.

7. **Project duration:** 24 months.

8. **Estimated cost:** US$12.5 million (including consultants cost).

9. **Present external involvement:** Bilateral or multilateral grant required.

Roads Project Profile no. 5

REHABILITATION OF 790 KM OF NATIONAL HIGHWAY

1. **Area/sector:** Transport and Communications /Capital assistance, Road Rehabilitation.

2. **Location:** Whole country.

3. **Implementing agency:** Department of Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** Much of the national highway network was severely damaged during hostilities especially in the early 1970s. It has also deteriorated due to lack of maintenance. Attempts to rehabilitate the system since 1979 have been hampered by shortages of finance, equipment, materials and skill and continuing hostilities. Roads and road transport, however, play a leading role in development activities so that the network should be urgently rehabilitated.

5. **Project description:** Because the Department's present road construction capacity is only 80 km per year, international contractors and consultants should be employed in the following works if the authorities in Phnom Penh agree:

(a) Pavement strengthening (130 km) --
40 km within Phnom Penh-Kampot section, RN3;
90 km within Phnom Penh-Pursat section, RN5.

(b) Rehabilitation (660 km) --
20 km within Bat Rakor-Takeo section, RN2;
85 km within Pursat-Battambang section, RN5;
85 km within Kompong Thom-Serei Sophon section, RN6;
40 km within Junction of RN5-Skun section, RN6;
40 km within Skun-Baray section, RN6;
150 km within Skun-Viet Nam border section, RN7;
280 km within Viet Nam border-Kratie-Laos border section, RN13.

Length, section, phasing and level of improvement of the above-mentioned roads are all presumably set forth in order to clarify the size and costs of the project; they are all subject to verification and revision. As for project componment (a), pavement strengthening, they might be done on the direct employment of the Department instead of introduction of international contractors.

6. **Expected impact:** The construction works immediately create opportunities of local employment. Large benefits accrue from reduced vehicle operating costs and trip times in commodities and passenger transport.

7. **Project duration:** Five years.

8. **Estimated cost:** US$109.4 million comprising:
Strengthening $10.4m;
Rehabilitation $99m.

9. **Present external involvement:** Unknown. Multilateral or bilateral consessional loans required.

Roads Project Profile no. 6
PROVISION OF FERRY FACILITIES

1. **Area/sector:** Transport and Communications/Capital assistance, Highways.

2. **Location:** Stung Treng, Kompong Cham, and Srey Veng Provinces.

3. **Implementing agency:** Department of Roads and Bridges, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** All traffic north and east of Phnom Penh cross a river by means of a ferry. Of the four ferry crossings in Kampuchea, two are on the Mekong, one on the Tonle Sap river and one on Tonle San. The ones on the Mekong are at Neak Leung (2 ferries), Tonle Bet/Kompong Cham (1 ferry), and Stung Treng (2 ferries) crossing is at the Tonle San and the Tonle Sap crossing at Prek Kdam (2 ferries). Of the seven ferries, three (at Neak Leung and Tonle Bet/Kompong Cham) were provided by Oxfam, together with spare parts and repair workshops. One of these ferries has since been destroyed in a guerrilla attack. The two ferries at Stung Treng are completely obsolete.

5. **Project description:** While the assessment of the actual requirement is not yet made, if authorities in Phnom Peng agree, supply of: two 120-tom ferries at Tonle Bet Kompong Cham and Neak Leung respectively (4 ferries); two 60-ton ferries at Prek Kadang; and two 45-ton ferries at Stung Treng is proposed. The capacities and quantities are presumably set forth to clarify the size and cost of the project.

6. **Expected impact:** First, the project immediately restores the ferry system's transport capacity which is now a serious bottleneck to transport. In the longer term, it ensures the smooth flow of traffic between the country's principal cities.

7. **Project duration:** Eight months.

8. **Estimated cost:** US$3.7 million comprising: two 120-ton ferries @ $850,000, two 60-ton ferries @ $550,000 and two 45-ton ferries @ $450,000.

L. RAILWAYS

Railways Project Profile no. 1
PROVISION OF DIESEL LOCOMOTIVES

1. **Area/sector:** Transport and Communications/capital assistance, railways.

2. **Location:** Railway lines between Kompong Som-Phnom Penh, Phnom-Serei Sophon, and Serei Sophon-Poipet.

3. **Implementing agency:** Department of Railways, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** Large volumes of aid commodities are expected to be transported within Kampuchea immediately after a political settlement. Current expectations are that some 250,000 people will soon be returning to the north-west provinces. Returnees are likely to be processed through five different locations strung out along the railway line between Pursat and Serei Sophon. The WFP is working towards the possibility of bringing rices in via Kompong Som, which can handle ships 10,000 to 12,000 tons (as opposed to Phnom Penh, which is limited to ships of 1,000 to 2,000 tons) and transporting them by means of railway through Phnom Penh. However, the Kampuchean Railways Corporation is now destitute and needs to be revitalised, particularly through the supply of locomotives to haul goods cars.

5. **Project description:** If agreed to by authorities in Phnom Penh, supply of at least 6 locomotives of at least 1,000 to 1,200 hp, to be distributed, two each, to the Kompong Som-Phnom Penh line, the Phnom Penh-Serei Sophon line, and the Serei Sophon-Poipet line.

6. **Expected impact:** The project will immediately strengthen rail haulage capacity for emergency aid commodities. In the longer term, the general transport infrastructure for both goods and passenger traffic will be strengthened.

7. **Project duration:** 6 months.

8. **Estimated cost:** US$1.5 million.

Railways Project Profile no. 2
PROVISION OF RAILWAY EQUIPMENT

1. **Area/sector:** Transport and Communications /capital assistance, railways.

2. **Location:** Whole country.

3. **Implementing agency:** Department of Railways, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** The railway system was used occasionally during the Pol Pot period, but is deteriorated badly due to the hostilities in the 1970s and lack of maintenance lasting decades. In particular, almost 80 per cent of some 550 bridges in the system were destroyed or damaged, and nearly half of the roadbeds were destroyed. Although they have been in service, using temporary repairs between Kompong Som-Phnom Penh and Phnom Penh-Serei Sophon, they need to be rebuilt. Therefore, equipment to repair, maintain and rehabilitate all bridges and roadbeds is needed so that the rail system can respond effectively to the expected increase in traffic. Passenger cars and communications equipment which also was damaged or has deteriorated are needed.

5. **Project description:** Supply of the following equipment: equipment to repair, maintain and rebuild the bridges and roadbeds including optimal numbers of bulldozers, stone crushers, motor graders, dump trucks, front-end loaders and welding equipment with supporting generators; 24 sets of portable radiophone equipment to replace the present Soviet equipment which is reportedly in poor repair. Permanent equipment could be supplied at a later date.

6. **Expected impact:** The project will immediately strengthen the capacity of the department to maintain the system and haul increased passenger and commodities traffic.

7. **Project duration:** 10 months.

8. **Estimated cost:** US$3.7 million comprising:
Heavy equipment, 30 vehicles and plant, $2.5m;
Radiophones, 24 sets $0.34m:
Passenger cars, 30 units $0.86m.

Railways Project Profile no. 3

RECONSTRUCTION OF POIPET-THAI BORDER-SEREI SOPHON SECTION OF RAILWAYS

1. **Area/sector:** Transport and Communications/Capital assistance, railways.

2. **Location:** Railway line between Poipet and Serei Sophon.

3. **Implementing agency:** Department of Railways, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** This line, together with RN5 which runs parallel to it, was the main transport corridor for passengers and freight between Thailand and Kampuchea before the Khmer Rouge took over. Although some repair work has begun, the roadbeds were severely damaged, much of the work has been removed, and almost all the bridges were destroyed. Although no detailed reconnaissance has been undertaken, it is clear that section of track must be urgently reconstructed to meet aid transport requirements from Thailand following a political settlement.

5. **Project description:** Procurement of international consultants for detailed design and construction supervision, and of contractors to rebuild the 40 km stretch railway.

6. **Expected impact:** Construction work will immediately provide employment for the local population. The project will re-establish transport links between Thailand and Kampuchea so as to haul aid commodities to the resettlement centres which may be located in Battambang province. It will serve, in the long run, to provide transport for tourists visiting the striking ruins of Angkor Wat.

7. **Project duration:** 30 months.

8. **Estimated cost:** US$16.2 million comprising:
Technical assistance -- $1.1m;
Sub-contracts -- $100,000;
Construction -- $15m.

9. **Present external involvement:** Bilateral or multilateral grant or concessional loan required.

Railways Project Profile no. 4

CONSTRUCTION OF 10 KM RAIL SPUR FOR CEMENT FACTORY

1. **Area/sector:** Transport and Communications /Capital assistance, railways.

2. **Location:** Kampot province.

3. **Implementing agency:** Department of Railways. Ministry of transport, communications and posts.

4. **Objective and justification:** A large cement plant, SONACIMENT established in the 1950s at Chakrey Ting, Kampot province. The Government is considering substantial rehabilitation and expansion of the factory to meet expected future large increases in demand. One aspect of the expansion would involve new transport facilities to enable cement distribution to the rest of the country, and in particular, the construction of a new rail spur of about 10 km across flat terrain to link the plant with the main Kampot-Phnom Penh railway line.

5. **Project description:** If agreed to by Phnom Penh authorities: feasibility study and construction of some 10 km rail spur from the main Kampot-Phnom Penh line to the expanded SONACIMENT plants will be proposed.

6. **Expected impact:** To improve cement transport to the rest of the country to meet the expected large increase in demand. To save foreign exchange expanded to import the cement.

7. **Project duration:** 20 months.

8. **Estimated cost:** US$4.1 million comprising:
Technical assistance -- $440,000;
Sub-contracts -- $60,000;
Construction -- $3.6million.

9. **Present external involvement:** None. Bilateral or multilateral loan required.

M. PORTS

Ports Project Profile no. 1

STUDY OF MARITIME TRANSPORT CONSTRAINTS AND PORTS DEVELOPMENT MASTER PLAN

1. **Area/sector:** Transport and Communications /Technical assistance, maritime transport.

2. **Location:** Kompong Som and Phnom Penh ports.

3. **Implementing agency:** Department of Kompong Som Port, Department of Phnom Penh Port, Kampuchean Shipping Corporation (Kamsab)/Ministry of Transport, Communications and Posts.

4. **Objective and justification:** Kampuchea must overcome many infrastructural and organizational constraints if it is to fully exploit its considerable potential for economic development. With the growth in international trade that must be expected over the coming years, the maritime transport sector, particularly the ports, is likely to be a major bottleneck. Considerable investments in financial and management resources will be required. The proposed study on such issues as legislation, management, tariffs, computerization and containerization will determine the precise nature and scope of the investments.

5. **Project description:** If Phnom Penh authorities agree, expert surveys and guidance on maritime legislation, port management and control, port tariff structures and pricing, port computerization and containerization be proposed.

6. **Expected impact:** Provision of basic data and rationale for port development.

7. **Project duration:** 2 months, including 1 month survey.

8. **Estimated cost:** US$90,000 consisting:
Technical assistance -- 2 months $84,000;
Other expenditures $6,000

9. **Present external involvement:** None, multilateral grant required.

Ports Project Profile no. 2

PROVISION OF CARGO HANDLING EQUIPMENT TO MEET IMMEDIATE PORT NEEDS

1. **Area/sector:** Transport and Communications/Capital assistance, maritime transport.

2. **Location:** Kompong Som and Phnom Penh ports.

3. **Implementing agency:** Department of Kompong Som Port, Department of Phnom Penh Port, Kampuchean Shipping Corporation (Kamsab)/Ministry of Transport, Communications and Posts.

4. **Objective and justification:** 1988 cargo flows through Kampuchea's two maritime ports, Kompong Som and Phnom Penh, at 208,000 tons and 120,000 tons respectively, were only one third of the volumes handled in 1968. However, large volumes of emergency aid and reconstruction materials are expected to pass through the ports following a political settlement. Both ports therefore urgently need additional cargo handling equipment and ancillary items.

5. **Project description:** If authorities in Phnom Penh agrees, it is proposed to provide both ports with the optimal numbers of forklift trucks, tractor trailers, stevedoring pallets and ancillary items, or any other import cargo handling system, as determined by the study on physical constraints to cargo handling. While there are no detailed study on the current ports facilities and equipment, main constraints to cargo handling seem to be a lack of forklift-trailer system.

6. **Expected impact:** Strengthening the cargo handling capacity of both ports through urgent introduction of modern, mechanized cargo handling systems.

7. **Project duration:** 8 months.

8. **Estimated cost:** US$2.17 million comprising: Equipment -- six 5-ton forklifts @$70,000, 16 30-ton tractor-trailers @$100,000, other items $150,000.

9. **Present external involvement:** None.

N. WATERWAYS

Waterways Project Profile no. 1

HYDROGRAPHIC SURVEYS AND CHANNEL MARKING

1. **Area/sector:** Transport and Communications /Capital assistance, inland navigation.

2. **Location:** The Mekong, the Tonle Sap and the Bassac rivers, and the Great Lake.

3. **Implementing agency:** Department of Water Transport, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** To provide information essential to improvement of navigation conditions and safety for shipping on the Mekong, the Tonle Sap river, the Bassac and the Great Lake. Hydrographic charting took place in some stretches of the Mekong before 1975 using equipment donated by New Zealand and others, and some charting has been done since 1979. A basin-wide project for updating the hydrographic atlas was started by Finland in 1988.

Even though hydrographic survey works have been carried out for many years only half of the Mekong river and two-thirds of the Tonle Sap river have been surveyed with adequate accuracy for navigation purposes. None of the other waterways, including the Great Lake, have been surveyed adequately. Also, the Mekong river bed is changing constantly. A topo-hydrographic survey of the Mekong, the Tonle Sap river and the Great Lake with a higher degree of accuracy than earlier surveys is required to revise the navigation charts of the river between the Khmer/Vietnamese border and Kompong Cham and to gather more hydrographic information for further study and planning.

5. **Project description:** If Phnom Penh authorities agree: re-establish missing ground control points of the existing vertical and horizontal-control networks on the Mekong mainstream from Kratie to the Viet Nam border and also on the Great Lake; 6 months. Topographic mapping of the mainstream between Kratie and Viet Nam border, and the Great Lake; 6 months for field and office work. A new survey of the whole Mekong mainstream and its major tributaries and a first survey of the Great Lake, to collect hydrographic information fundamental to improvement of the national network of navigable inland waterways.

Revision of the existing navigation charts – identification of difficult stretches of the river where aids to navigation need to be placed, and the placing of these aid (channel marking). Study of the hydraulic regime of the river as a basis for planning river training works. Hydrographic survey by the Khmer hydrographic services during two consecutive dry seasons: 2 years. Desk study on channel marking: 6 months.

Channel markings -- 2 years. Appropriate channel markers will be placed along the Mekong between Kratie and the Viet Nam border and the Tonle Sap, to facilitate both day and night navigation.

6. **Expected impact:** The project will eventually lead to more efficient and safer navigation due to quicker turn around of ships and boats. It is currently difficult to calculate a benefit value of these, due to unpredictably changing cargo transport patterns during the period 1970-2000. However, it is clear that efficient navigation can bring substantial cost reductions to imports and exports. River transport seems currently the least expensive means of transport.

7. **Project duration:** 24 months.

8. **Estimated cost:** US$2,212,000, excluding the authority's cost, and comprising
Equipment -- ground control survey $40,000, hydrographic marking $325,000 and channel marking $1,775,000.

9. **Present external involvement:** It is expected that the Mekong Secretariat will act as implementing agency and liaise with the relevant governmental department in Kampuchea for executing the works. Consultants and equipment will be obtained for bilateral grant.

Waterways Project Profile no.2
DREDGING OF NAVIGABLE INLAND WATERWAYS

1. **Area/sector:** Transport and Communications /Technical and capital assistance, Inland Navigation

2. **Location:** Downstream of Phnom Penh: Peam Choi-Banam, Dey Elih-Chrul Changwar. Upstream of Phnom Penh: Sdau-Peam Chikang.

3. **Implementing agency:** Department of River Transport, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** The rehabilitation of existing waterways to restore navigation and fish access to the Great Lake from the Mekong River, and improvement to permit the use of larger vessels. Dredging was carried out in the approaches to Phnom Penh harbour since the beginning of this century until the early 1970s. Equipment had then recently been supplied by the Netherlands. Little apparently has been done since, and a significant accumulation of sediment has resulted.

5. **Project description:** If Phnom Penh authorities agree: Preliminary stage. While routine dredging goes on, a 12-month study is required to determine the exact number, type and capacity of dredges needed for the proposed programme. Suitable dredges would then be ordered. Dredging would commence on shallow stretches of the Mekong upstream and downstream of Phnom Penh. Operations would be expanded to take in the entire navigable part of the Mekong, including the Tonle Sap river and part of the Great Lake.

6. **Expected impact:** Dredging in the approaches to Phnom Penh harbour itself is necessary to ensure the future of Phnom Penh as a port for seagoing vessels. Opening up the Tonle Sap river channel will allow river craft to ply the river and lake. In addition, dredging shallow stretches upstream from Phnom Penh would enable seagoing vessels to reach points further inland. These shallow stretches include, downstream of Phnom Penh: Peam Choi-Banam, Dey Elih-Chrul Changwar, upstream of Phnom Penh: Sdau-Peam Chikang.

7. **Project duration:** 30 months.

8. **Estimated cost:** US$7,250,000 comprising: Equipment -- 1 grab dredge $750,000, 1 self-propelled training suction dredge $3,750,000, 1 cutter section dredge $1,750,000;
Management and operation for a year $1 million.

9. **Present external involvement:** Multilateral grant required. The Mekong Secretariat will act as implementing agency and liaise with the relevant government department in Kampuchea for executing the works. A consultant and equipment will be obtained from the donor country for training and supervision of the counterpart staff.

Waterways Project Profile no. 3
UPDATING THE STUDY ON DEVELOPMENT OF RIVER PORTS

1. **Area/sector:** River Transport and Communications/Technical assistance, river port.

2. **Location:** Phnom Penh, Chrul Changwar.

3. **Implementing agency:** Department of River Transport, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** To upgrade shipping services at Phnom Penh by means of new river port facilities on the Mekong river. This project was conceived in 1955 by the Khmer government. In the same year, the peninsula of Chrul Changwar was chosen as the best site for the new Phnom Penh port by the Khmer port authority. A survey to pinpoint the exact location for the new port was completed by a group of Japanese experts in 1965. A bridge over the Tonle Sap river connecting Chrul Changwar with Phnom Penh was constructed and put into use in 1967. The necessary harbour terrain for the port was acquired and cleared. Complete designs and plans were made by a team of Japanese experts in co-operation with the port authority in 1969.

5. **Project description:** If Phnom Penh authorities agree, upgrading of the study on the facilities and cargo traffic projections is needed to review the requirements for port rehabilitation and development. Ultimately, Chrul Changwar will replace the existing port of Phnom Penh on the Tonle Sap river, as a terminal for ocean shipping, and Banam will become the port for rice and fish products. Intermediate steps for Chrul Changwar would involve plan and design for the move and new construction (since many plans and designs are already available, one more year will be enough for this preparatory work), while for Banam a survey is necessary to identify the best location for the quay or jetty and to determine port equipment requirements.

6. **Expected impact:** In 1973 the benefits were estimated as:

Chrul Changwar project. Annual return US$4.55 million made up of:

(a) $0.5 million saved by new location eliminating the need to dredge in the present Tonle Sap river harbour entrances and alongside the existing jetties and quay;

(b) $3.6 million saved by ships loading to 5.0 meters (the maximum draft at the Mekong entrances from the sea). Despite dredging of the port entrances, ships are now often limited to 4.3 meters during the low-water period. Based on an average 2,000 dwt ship, this means a loss of some 300 tons of cargo both ways at an average freight of $20 = $12,000 per ship per voyage. Estimating 300 ships a year (not including tankers), this means more freight capacity to a value of 300 x $12,000 = $3.6 million with existing shipping;

(c) $450,000 saved by having cargo handling time due to better equipment logical lay-out of godowns, quays and access roads. This represents a saving for all cargo per round trip at a mean $41,500 per harbour-day so 300 ships x $1,500 = $450,000.

Banam project. For this rice centre, ships will be able to load directly from the shore and not have to first stream 30 miles upstream to Phnom Penh and load there from barges or junks coming from Banam. The elimination of barge traffic between Banam and Phnom Penh for this purpose will save an estimated $100,000. The elimination of the need for ships to go beyond Banam to Phnom Penh and back (100 km) will save an average of $200 per ship per one-way voyage.

7. **Project duration.** 12 months for consultant works.

8. **Estimated cost:** US$1 million.

9. **Present external involvement:** If Phnom Penh authorities agree, the Mekong Secretariat would act as implementing agency on behalf of the relevant department.

O. AIRWAYS

Airways Project Profile no. 1

STRENGTHENING THE TECHNICAL AND MANAGEMENT CAPABILITY OF KAMPUCHEA AIRLINES

1. **Area/sector:** Transport and Communications /Technical assistance, civil aviation.

2. **Location:** Kampuchea Air Company. Phnom Penh.

3. **Implementing agency:** Kampuchea Airlines.

4. **Objective and justification:** In the late 1960s, the then national airline, Royal Air Cambodge, claimed considerable commercial and operational success. The airline was severely damaged, both physically and institutionally during the 1970s, however, and national efforts to revive it has been hampered by lack of funds, equipment and expertise. The technical and management capabilities of Kampuchea Airlines therefore need to be strengthened by foreign expertise.

5. **Project description:** If agreed by the Phnom Penh authorities, technical assistance would include expert services, scholarships and the provision of training equipment. Key areas would include air transport economics, the organization and administration of commercial aviation licensing procedures, and the structure of the national airline.

6. **Expected impact:** The project would strengthen the physical and institutional capability of Kampuchea Airlines.

7. **Project duration:** 24 months.

8. **Estimated cost:** US$1.2 million comprising:
Technical assistance -- two international experts $640,000;
Scholarship -- 48 m/m $400,000;
Training equipment -- $160,000.

9. **Present external involvement:** Bilateral or multilateral grant required.

Airways Project Profile no. 2

STUDY TO UPGRADE AND IMPROVE AIRPORT FACILITIES

1. **Area/sector:** Transport and Communications /Technical assistance, airports.

2. **Location:** Whole country.

3. **Implementing agency:** Ministry of Internal Affairs.

4. **Objective and justification:** The airport facilities at Phnom Penh and Siem Reap were seriously damaged during the 1970s. Facilities at other smaller airfields deteriorated due to neglect. Attempts to rehabilitate the airfields since 1979 have been hampered by lack of funds and equipment, and security problems in remote areas.

5. **Project description:** If the authorities in Phnom Peng agree: Studies to upgrade and expand the air traffic and terminal facilities at Phnom Penh and Siem Reap airports, and to improve the existing airport facilities at Kompong, Som, Battambang, Kratie, Samroang, Koh Kong, Lumphat, Sen Manorom and Stung Treng.

6. **Expected impact:** To identify present constraints to airport development and establish a basic physical plan to improve, upgrade and/or expand airport facilities.

7. **Project duration:** 12 months.

8. **Estimated cost:** US$1 million comprising:
Technical assistance -- international consultants $700,000; sub-contract $200,000;
Other expenditures -- $100,000.

9. **Present external involvement:** Bilateral or multilateral grant required.

P. TELECOMMUNICATIONS

Telecommunications Project Profile no. 1
MASTER PLAN FOR DEVELOPMENT OF INTERNAL TELECOMMUNICATIONS NETWORK AND CONSTRUCTION OF MICROWAVE CIRCUIT LINES BETWEEN PHNOM PENH AND BATTAMBANG

1. **Area/sector:** Transport and Communications/Technical and capital assistance, Telecommunications.

2. **Location:** Whole country (master plan). Construction of microwave circuit line between Phnom Penh and Battambang.

3. **Implementing agency:** Department of Posts and Telecommunications, Ministry of Transport, Communications and Posts.

4. **Objective and justification:** The domestic telephone system is both old and limited, even between the principal cities. As a first step towards system rehabilitation and expansion, general telecommunications demand needs to be established. The appropriate response would involve both technical and cost considerations. But since Battambang is expected to become a major resettlement centre involving the concentration of both aid services and commodities distribution a microwave circuit line between Phnom Penh and Battambang should be created immediately.

5. **Project description:** If authorities in Phnom Penh agree: Consultants will produce an inventory, review physical and organizational rehabilitation capabilities and recommend an optimal reconstruction and development programme. The project will include the designs and supply and installation of microwave systems or other optimal alternatives to communicate between Phnom Penh and Battambang.

6. **Expected impact:** The study will provide a comprehensive master plan to guide the domestic telecommunications development programme. Supply and installation of the microwave systems, or other optimal telecommunications system, between Phnom Penh and Battambang will help to strengthen the telecommunications network capacity.

7. **Project duration:** 36 months, 12 months for master plan and design of the specified section. Construction will require 24 months.

8. **Estimated cost:** US$15.08 million comprising:
Technical assistance -- International consultants $ 1,420,00;
Training -- foreign/local $710,000;
Equipment and building -- supply and installation $13.58m, consisting of
Microwave systems $4,220,000, installation and testing $840,000;
Tower $710,000, installation and testing $1.43m;
Multiplex systems $390,000, installation and testing $70,000;
Exchange systems $900,000, installation and testing for exchange systems $90,000,
Subscriber systems $2.36m;
Building $1.86m.

9. **Present external involvement:** Bilateral or multilateral grant required.

Q. URBAN DEVELOPMENT

Urban Project Profile no. 1
URBAN DEVELOPMENT STRATEGY

1. **Area/sector:** Human settlements/Settlement planning.

2. **Location:** Phnom Penh and all urban areas.

3. **Implementing agency:** Physical Planning Office.

4. **Objective and justification:** To undertake a comprehensive review of the current status of main urban areas in Kampuchea, assess their development needs, specify and quantify the costs of minor urban public works programmes designed to upgrade them to agreed standards, and assign priorities to guide future investment planning by central and provincial authorities. The review would also incorporate an assessment of the institutional capabilities to undertake this work both in central and provincial governments. Urban development in Kampuchea is at an early stage, but already the pace of development in Phnom Penh is greatly outstripping that of the many provincial cities. It is important to try to correct urban/rural imbalances soon, and avoid the type of urban/rural dichotomies which prompted the radical solution of the late 1970s.

5. **Project description:** The project will compile an inventory of infrastructure availability in each urban centre, prepare realistic population projections for each, and draw up rough outlines for future town development. On this basis, realistic financing programmes will be designed to upgrade the towns to acceptable standards, taking into account their present and future roles. Monitoring procedures will be installed by enhancing central institutional capability.

6. **Expected impact:** Equal development of Phnom Penh and other urban centres, diminishing thre capital's attractiveness to migrants.

7. **Project duration:** Initially two years.

8. **Estimated costs:** US$850,000 comprising:
International personnel -- $250,000;
Subcontract -- $500,000;
Miscellaneous and equipment -- $100,000.

Urban Project Profile no. 2
PHNOM PENH URBAN DEVELOPMENT

1. **Area/sector:** Human settlements/Settlement planning.

2. **Location:** Phnom Penh.

3. **Implementing agency:** Municipality of Phnom Penh.

4. **Objective and justification:** To assist the authorities in Phnom Penh to prepare an outline strategy plan for the future development of the city that can be used as a basis for programming public works and other urban development projects. Justification: all public services (water supply, drainage, electricity, roads and sewers) in the city are in poor condition, and are in urgent need of repair and renewal. It will be necessary to draw up a strategy plan to provide a framework for these activities.

5. **Project description:** Assist the municipal authorities to undertake a rapid review of the current status of urban public works, of social services such as health and education buildings and housing, of transport and economic activities. Assist in the preparation of a strategy plan which will indicate the future physical development of the city. Prepare a financing plan for the above. Provide technical assistance as necessary.

6. **Expected impact:** To provide a basis for the future rational extension of the city.

7. **Project duration:** 12 months.

8. **Estimated cost:** US$700,000 comprising:
Sub-contract -- $500,000;
Training -- $50,000;
Equipment -- $150,000.

9. **Present external involvement:** Not directly, but a number of NGOs are working on the rehabilitation of the city.

Urban Project Profile no. 3
FEASIBILITY STUDY FOR PHNOM PENH DRAINAGE SYSTEM

1. **Area/sector:** Human settlements/housing and infrastructure.

2. **Location:** Phnom Penh.

3. **Implementing agency:** The municipality of Phnom Penh with external assistance.

4. **Objective and justification:** To undertake a feasibility study during the rainy season to identify local points of constraint in the drainage system of Phnom Penh and to formulate appropriate engineering responses. The city's drainage system is in urgent need of repair and renewal. The water supply system is being dangerously polluted, with consequent health hazards to the entire community, and young children in particular.

5. **Project description:** Locate constrictions and other faulty elements in the drainage system by visual inspection; prepare a plan indicating the location and nature of these constrictions; make recommendations on measures to eliminate these faults; supply manufacturing and batch plant for concrete pipes; supply 24 drainage pumps; provide technical assistance for the above and train counterpart staff.

6. **Expected impact:** To improve conditions of life for the population of Phnom Penh.

7. **Project duration:** 3 years.

8. **Estimated cost:** US$2.13 million comprising:
Personnel -- $500,000;
Training -- $50,000;
Equipment -- $1.58m.

9. **Present external involvement:** Various NGOs are involved, including OXFAM, PADEK and JANGOO.

R. HEALTH

Health Project Profile no. 1
TECHNICAL ASSISTANCE FOR HEALTH CARE PLANNING

1. **Agency/sector:** Health care planning and management.

2. **Location:** Phnom Penh and nationwide.

3. **Implementing agency:** Ministry of Health.

4. **Objective and justification:** The project's aim is to help determine an appropriate method of evaluating objectives, management and services of the health care system. The official broad policy framework for health services in Kampuchea is that they should emphasize prevention, and offer free universal care, with special concern for women, children, and minorities. In contrast, the present services are urban and curative in orientation and training for health workers reflects this. External assistance from humanitarian organizations has supported the present services and also added programmes that are sometimes not fully integrated into the health service administration. In this context there is confusion over how to allocate health resources and how to orient health worker training.

5. **Project description:** If health authorities agree, a qualified consultant would come to look at the health system in order to identify the scope and nature of the problem. The consultant's report would offer an analysis of how official health policy, present health services, and external aid in the health sector relate to each other and to what extent this poses problems for effective use of health care resources. The report would include recommendations for steps that could be taken for further consideration of the problem.

6. **Expected impact:** Short-term -- to provide a stimulus to and interest in planning for a managing health service in Kampuchea, and establish a basis for further action.
Long-term -- to improve effectiveness and efficiency of health care services in Kampuchea, producing better health and longer lives for the populace.

7. **Project duration:** 2 – 3 months.

8. **Estimated cost:** US$30,000 – 40,000 comprising:
Technical assistance -- $400/day, 60-90 days, plus $3,000 travel = $27,000 – $39,000;
Training -- no formal component;
Equipment -- report preparation and translation into Khmer, photocopying, etc. = $2,000

9. **Present external involvement:** UNICEF, ICRC, Red Cross Societies, 14 other NGOs.

Health Project Profile no. 2

TECHNICAL ASSISTANCE FOR CLEAN DRINKING WATER

1. **Area/sector:** Health/Clean drinking water.

2. **Location:** Phnom Penh base with nationwide application.

3. **Implementing agency:** Ministry of Health – Water Supply and Sanitation, and Ministry of Agriculture – Rural Development.

4. **Objective and justification:** Help start the planning process for a nationwide approach to providing clean drinking water for everyone. Estimates of the availability of clean drinking water to the Khmer population run as low as 1 per cent. The health of the entire population is affected by unclean drinking water, particularly in the illnesses of small children. Health and educational institutions, especially in rural areas, generally do not have clean drinking water available, seriously diminishing their capacity to provide good health services, or instruct others in good health practices.

5. **Project description:** If agreed to by Phnom Penh authorities, a qualified consultant would meet with government and NGO personnel involved in providing clean drinking water to review the availability of clean drinking water in Kampuchea, and the efforts to date to make it available to health and educational institutions and to communities. The consultant would submit a report summarizing this information and suggesting what steps might be taken and what funds would be needed to develop a coordinated strategy for attracting and allocating resources to increase the pace at which water is being made available.

6. **Expected impact:** Short term -- to raise awareness of the problem and the effect of efforts to address it, and to help set the stage for development of a strategy to make clean water available on a wider scale.
Medium term -- development of a nationwide approach to providing clean drinking water, and for attracting resources to make it possible.
Longer term -- clean drinking water and therefore better health for an increasing number of people.

7. **Project duration:** 2 months.

8. **Estimated cost:** US$29,000 comprising:
Technical assistance -- $400/day, 60 days, plus $3,000 travel = $27,000;
Training -- no formal component;
Equipment -- reference material, catalogues, report preparation and translation into Khmer and duplication = $2,000.

9. **Present external involvement:** UNICEF, OXFAM, JVC, LWS, JANGOO, CIDSE.

Health Project Profile no. 3
MATERIAL ASSISTANCE TO HEALTH WORKER TRAINING INSTITUTIONS

1. **Area/sector:** Health/training.

2. **Location:** All provinces.

3. **Implementing agency:** Ministry of Health, national and provincial offices.

4. **Objective and justification:** To provide hygienic and educationally supportive setting for health worker training programs. There are 17 provincial and 5 regional health worker training institutions. Most health care workers receive training in settings which are unsanitary, lacking clean drinking water or proper waste disposal, greatly reducing their opportunity to learn and carry out hygienic health practices. The institutions often lack adequate desks, chairs, lighting, and basic classroom equipment to support a learning environment. Teaching materials are generally scarce, and laboratories rarely adequate to the teaching task.

5. **Project description:** Donor agencies would need to explore with the Ministry of Health and agencies currently providing assistance the needs of each institution. Agreement would need to be reached on construction needs for dormitories, kitchens, and classrooms, and for equipment for the different structures. Arrangements for monitoring would be essential. Donors would generally fund imported materials, some construction and transportation, possibly technical advice for water and electrical services, and equipment.

6. **Expected impact:** Short-term -- better training for future health workers.
Long-term -- better health for the population.

7. **Project duration:** Depends on numbers/kinds/conditions of institutions. Construction is usually undertaken in the dry season (Jan-May). Several construction seasons may be needed.

8. **Estimated cost:** US$20,000 to 200,000 per institution.

9. **Present external involvement:** UNICEF, ICRC, other RC societies, EdC, JANGOO, MCC, WVI.

Health Project Profile no. 4
TECHNICAL ASSISTANCE TO PHARMACEUTICAL PRODUCTION

1. **Area/sector:** Health/pharmaceuticals.

2. **Location:** Phnom Phen.

3. **Implementing agency:** Ministry of Health - Department of Pharmacy.

4. **Objective and justification:** The health delivery institutions in Kampuchea lack medicines throughout the system. Three pharmaceutical factories in Phnom Penh are in operation, but are limited by the lack of funds to obtain imported raw materials. The resulting shortage of medicines in government facilities has led to large scale private importation of medicines that are sold with insufficient attention to their relevance or effectiveness. The health of the public would be better protected if the pharmaceutical factories could produce needed medicines at lower cost.

5. **Project description:** If the appropriate officials in Phnom Penh agree, a consultant would come to Phnom Penh to look into ways of increasing the production of pharmaceuticals in Kampuchea and prepare a report recommending ways of obtaining funds for necessary and appropriate materials and supplies.

6. **Expected impact:** Short term - production of recommendations that could serve as the basis for a plan from privately imported medicines. Long term - more availability of medicines in government health facilities; less risk to public from privately imported medicines.

7. **Project duration:** 1 month.

8. **Estimated cost:** US$15,000 comprising
Technical assistance -- one consultant, @ $400/day, for 30 days plus air travel of $3,000 = $15,000;
Training -- no formal component, but study tours for Khmers might be recommended.
Equipment -- consultant would recommend.

9. **Present external involvement:** WCC, CIDSE, ACR.

S. EDUCATION

Education Project Profile no. 1
TECHNICAL ASSISTANCE IN EDUCATION PLANNING

1. **Area/sector:** Education/Policy Planning.

2. **Location:** Phnom Penh.

3. **Implementing agency:** Ministry of Education.

4. **Objective and justification:** The objective is to help identify educational goals, and help guide curriculum development, teacher training, and allocation of educational resources towards those ends. A basic necessity for economic and social development is a literate population with training available in skills needed for the society's growth. Since 1979 Kampuchean authorities have worked very hard to establish and expand general education and provide basic literacy throughout the country. It is now appropriate to make a clearer determination of what knowledge and training is relevant for a system preparing most people for adult life in agriculture while equipping some to serve other development needs. Major questions of educational management and administration, especially the question of salaries, also need to be addressed.

5. **Project description:** Upon agreement of Khmer authorities, consultants with experience in educational policy planning in developing countries would come to Kampuchea. Their task would be to assemble and review information on the present performance of the system of primary and secondary education. In discussion with national and provincial staff of the Ministry of Education, with key people in the Ministries of Agriculture, Industry, and plan and with parties currently providing external assistance, the consultants would prepare a report reviewing the performance of the system of general education, identifying policy choices for the Kampuchean educational system, spelling out implications of each choice for allocation of resources including external assistance, curriculum development, teacher training, and educational management.

6. **Expected impact:** Short-term - immediate enhancement of capability of authorities to develop educational policy. Lay the groundwork for future allocation of resources. Long-term - more effective and efficient allocation of human and material resources for education so that it serves more effectively the needs of the Khmer people.

7. **Project duration:** 2 consultants, qualified in educational policy at the primary and secondary level, for 2 1/2 to 3 months.

8. **Estimated cost:** US$70,000 - 120,000 comprising:
Technical assistance -- @ $400/day, 75 - 90 days for 2 persons plus $3,000 air travel each = $66,000 - $78,000;
Training -- no formal component planned; may emerge as a recommendation;
Equipment and supplies -- reference materials, basic office supplies and communications costs, cost of duplicating and translating report into Khmer = $5,000.

9. **Present external involvement:** UNICEF, Australian Catholic Relief, CIDSE, Joint Australian NGO Office, Mennonite Central Committee.

Education Project Profile no. 2
TECHNICAL ASSISTANCE FOR LITERACY EVALUATION

1. **Area/sector:** Education/literacy.

2. **Location:** Phnom Penh base.

3. **Implementing Agency:** Ministry of Education – Directorate of Adult Education.

4. **Objective and justification:** Universal literacy, or close to it, is an important ingredient for national development. Khmer authorities have worked hard to establish nationwide basic education, with two campaigns to eliminate adult literacy as well. Achievements, in terms of numbers of school and numbers of adults in literacy classes, are substantial, but perhaps half those who began primary school left before they were functionally literate. Similarly, many adults completed literacy courses without becoming functionally literate. The objective is to determine the level of functional adult literacy to facilitate effective planning for improving it.

5. **Project description:** A qualified consultant would work with relevant officials in the Ministry of Education to: (1) draw up means to determine the country's adult literacy rate; (2) implement the study, by training and supervising the data gathering team; (3) prepare a report evaluating the results.

6. **Expected impact:** Short-term – senior staff enabled to evaluate a sector of their own education system, research team trained, and planning information available.
Long-term – significant reduction in illiteracy.

7. **Project duration:** 26 months.

8. **Estimated cost:** US$80,000 comprising:
Technical assistance -- one at $400/day for 90 – 180 days plus travel @ $3,000 = $75,000;
Training -- one week in Phnom Penh for 20 or so off-season teachers @ US$1 per day per person, plus some group programs = $1,000;
Equipment and supplies -- bicycles for interviewers $3,000, forms, writing equipment, etc. up to $1,000.

9. **Present external involvement:** UNICEF.

Education Project Profile no. 3
MATERIAL AID FOR SCHOOL CONSTRUCTION AND EQUIPMENT

1. **Area/sector:** Education/School Facility improvement

2. **Location:** All provinces (multiple projects)

3. **Implementing agency:** Ministry of Education (national and provincial)

4. **Objective and justification:** To improve the physical facilities and equipment of primary and secondary schools, and teacher training institutions. Since 1979, 4,730 primary schools, 373 lower secondary schools, 49 upper secondary schools, and 21 provincial and 6 regional teacher training centres have been established with very limited resources. Most of them need major improvements to the buildings. The great majority lack a clean water supply. The residential teacher training centres lack decent and sanitary living quarters and eating facilities. Basic teaching materials are very scarce. Improvement win these areas will enhance the learning/teaching environment and the general level of learning in the country.

5. **Project description:** Individual agreements would need to be negotiated with the Ministry of Education and provincial and local education staff for such construction work as necessary to improve buildings and provide drinking water, and for teaching materials and educational supplies according to the interest and resources of the donor. Donors would provide funds for construction, technical assistance when needed, e.g. to dig wells for water, and imported supplies such as cement for as many institutions as resources and interest would support.

6. **Expected impact:** Short-term -- improvement of learning/teaching environment, support to learning/teaching morale; safer and more sanitary teacher training facilities.
Long-term -- more effective teaching, reduced dropout rate; more literate population able to make use of written information in adult work roles.

7. **Project duration:** Variable, and related to number of institutions involved and scope of

assistance. Construction work done during the dry season (January – May). A single primary school can be built in a few months. A teacher training centre may require years to complete. School construction aid is generally provided over a period of years. Monitoring is essential throughout the project.

8. **Estimated cost:** Variable, depending on number of institutions and scope of aid. Basic primary school structure may cost US$ 3,000 Buildings alone in a regional teacher training centre may cost $300,000. Drinking water and classroom equipment would be additional.

9. **Present external involvement:** UNICEF, AFSC, ACR, CIDSE, JANGOO, MCC, especially in regional teacher training centres.

Education Project Profile no. 4
TECHNICAL AND MATERIAL AID FOR TEXTBOOK PRINTING

1. **Area/sector:** Education/Textbook Printing

2. **Location:** Phnom Penh

3. **Implementing agency:** Ministry of Education, Publication section

4. **Objective and justification:** To make textbooks available to schoolchildren. The general education system in Kampuchea (primary and secondary schools) enroll nearly 1.7 million children. The Ministry of Education has recently been helped to expand its printing capacity from 150,000 to 600,000 books a year. In order for children in school to have access to textbooks, an annual production capacity of at least 2 million books in needed.

5. **Project description:** Agreement would need to be negotiated with authorities in Phnom Penh to provide a qualified consultant to evaluate the volume of textbook needs in Kampuchea now and in the coming decade. With Phnom Penh authorities, the consultant would draw up a plan and submit for funding a proposal to expand the textbook printing capacity of the country to an appropriate size.

6. **Expected impact:** Short-term -- a plan, and greater capacity within the Ministry of Education to assess and plan textbook needs.
Long-term -- improve the quality of education for all children in the school system, to improve their capacity to make use of written material to manage their adult work lives.

7. **Project duration:** One to two months.

8. **Estimated cost:** US$20,000 – 35,000 comprising:
Technical assistance -- $400/day, 30 to 60 days, plus $3,000 travel = $15,000 – 27,000;
Training -- study tour for Ministry personnel to nearby countries = $3,000 – 5,000;
Equipment -- reference works, catalogues photocopies. etc. = $1,000.

9. **Present external involvement:** UNICEF, Vietnamese bi-lateral aid.

T. TRAINING

Training Project Profile no. 1
TECHNICAL ASSISTANCE FOR NATIONAL SURVEY

1. **Agency/sector:** Development Management/ Human Resources.

2. **Location:** Phnom Penh base with nationwide scope.

3. **Implementing agency:** Ministries of Plan, Education, Agriculture and Industry; Women's Association.

4. **Objective and Justification:** To assess the present human resources available to support and guide development assistance in Kampuchea, and clarify choices for strengthening managerial and technical skills of Khmers. The reconstruction of Kampuchean society to date has depended on relatively few people who have been called on to serve simultaneously in several roles, as planners and administrators in government offices, as technicians and supervisors for projects, and as trainers of future workers in their fields. A significant increase in the pace of development cannot be sustained without considerable expansion of human resources in these areas.

5. **Project description:** If authorities in Phnom Penh agree, a multi-disciplinary team of consultants would visit Phnom Penh to:

(1) review post secondary training in Kampuchea (what subjects of study are available; what are not; the quality and relevance of training, including assessment of curricula, pedagogy, language of instruction, libraries and reference materials, availability and utilization of laboratories and field placements, etc.) and assess the potential of new graduates for contributing the administrative, teaching and technical tasks of their respective fields;

(2) review the situation of the faculty members, who have other major responsibilities as administrators and project managers besides teaching, to assess their need for assistance as teachers, administrators and planners;

(3) assess the present and possible role of those who have returned from extended study abroad in strengthening the nation's development capability; and

(4) look at possible roles for overseas Khmers in contributing to the human resources needed for development in Kampuchea.

6. **Expected Impact:** Short-term -- an awareness of needs and human resources available for managing development in Kampuchea, as a basis for planning how to strengthen them. Longer term -- more effective management and planning for development.

7. **Project duration:** A team of five (a development economist, a management specialist, an agriculturalist, a water resources engineer, and a specialist in scientific and technical training) would spend up to three months to carry out the study and prepare a report.

8. **Estimated Cost:** US$200,000 comprising:
Technical assistance -- $400/day, for 5 x 90 days plus 5 x $3,000 travel = $195,000;
Training -- recommendations for training programs may result from the study;
Equipment and supplies -- provision of reference materials, basic office and communications expenses, cost of duplicating and translating report into Khmer = $5,000.

9. **Present external involvement:** All UN organizations and NGOs except those purely health related (Red Cross Societies, EdC, EE).

U. WOMEN

Women Project Profile no. 1
TECHNICAL ASSISTANCE FOR NATIONAL SURVEY

1. **Area/sector:** Women/widows.

2. **Location:** Phnom Penh; nationwide scope.

3. **Implementing agency:** Ministry of Health – Women and Children; Ministry of Agriculture – Rural Development: Women's Association.

4. **Objective and justification:** Obtain a clear picture of living conditions of widows and their families as a basis for planning. One legacy of the turmoil of the 1970s is a situation in which perhaps 20 per cent of rural families are headed by widows. About 1.5 million people may be dependent on widows for their daily living. Widows are at a serious disadvantage in attempting to do both the traditional work of men as well as "their own" work as women in carrying out farm and household tasks. Widow headed households are generally poor and in need of basic household items, with the resulting likelihood that children will be sick more and taken out of school early. Given the shortage of farmers in the country, widows need a way of being able to stay in farming and still have enough to live on.

5. **Project description:** If authorities in Phnom Penh agree, a consultant would come to Kampuchea to work out with people in the relevant sections of government an effective way of obtaining reliable information about the living conditions of widows and their families. If all agree and time is available, the consultant could proceed to assemble, train, and monitor survey teams to collect information in a sample survey of widows, and help evaluate the results.

6. **Expected impact:** Short-term -- enable authorities to obtain information necessary for effective intervention on behalf of widows and their families. Longer term -- lead to policy and program decisions that would improve the living conditions and the prospects for the future of widows in Kampuchea.

7. **Project duration:** 3 – 6 months.

8. **Estimated cost:** US$40,000 – US$80,000 comprising:
Technical assistance -- 90 – 180 days @ $400/day plus $3,000 travel = $39,000 – $75,000;
Training costs -- travel, lodging for a week, plus per diem for carrying out survey for 20 people = $2,000;
Equipment -- materials in Khmer for training course and survey work, bicycles to carry our survey = $4,000.

9. **Present external involvement:** UNICEF, AFSC (both in Family Food Program).

V. CULTURE

Culture Project Profile no. 1

SYMPOSIUM ON ANGKOR

1. **Area/sector:** Culture/Cultural preservation and development.

2. **Location:** Siem Reap, Angkor.

3. **Implementing agency:** UNESCO.

4. **Objective and justification:** To convene an international symposium on the current status and future of the monuments of Angkor. It is understood that the monuments have sustained damage over the past 20 years, mainly from neglect, and that a team from India has been working on them. This work should be reviewed and extended.

5. **Project description:** To convene a symposium of international experts on all aspects of restoration and history of ancient buildings. A report would be foreseen, together with a comprehensive plan of action for future treatment of the site. The recommendations should include steps necessary to prepare a physical plan of the whole area, so as to ensure that future building plans do not desecrate themselves. The cost of preparing such a plan is not included in the budget figure below.

6. **Expected impact:** To preserve in good state the Angkor monuments.

7. **Project duration:** 1 to 2 months (including time necessary to prepare papers for the symposium itself).

8. **Estimated cost:** Approximately US$100,000.

9. **Present external involvement:** The Indian Government has initiated work on the preservation of the monuments under a bilateral agreement.

VIII. Annotated Bibliography

A. BIBLIOGRAPHY

To assist future scholars and planners, the documents which the Mission has collected from various locations are listed here with brief descriptions of their content (and indexed by subject, author, and corporation in Section B. below). Further work will be required to compile a more complete bibligography.

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Foley, Sean
Australian Freedom from Hunger Campaign, Australia.
x+76pp (1988). Eng.
Evaluation of performance of irrigation projects fed by pumps. Pump performance affected by lack of spare parts. Extension services, high yield varieties, training.

00002
Kirirom Project - Preliminary Economic Analysis of the Merits of Expanding the Project at the Time of its Reconstruction.
Interim Mekong Committee, Bangkok, Thailand.
iii+40p (1974). Eng.
1974 desk study of restoring the 10 MW Kirirom hydro-power project. The project operated from 1968 until damaged in 1970. Output was to Phnom Penh. The transmission line has been removed.

00003
Inventory of Promising Water Resources Projects outside the Lower Mekong Basin in the Khmer Republic. Mekong Secretariat Working Paper (First Draft). WRD/MKG/INF/L 577
Interim Mekong Committee, Bangkok, Thailand.
(1973). Eng.
A 1973 desk study for projects in Kampuchea but outside the Lower Mekong basin. Data is subject to considerable error as the sites could not be visited and the information on topography, hydrology, and meteorology was meagre. The project relates to hydro-power and irrigation.

00004
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Carbonnel, J.P.; Guiscafre, J.
Ministere des Affaires Etrangeres, France.
viii+401(p) (1963). Fr.
A study of the Great Lake in 1962/63 concentrating on hydrology and sedimentation.

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***Etude sur l'Electrification du Cambodge* (Study on the Electrification of Cambodia).**
SOFRELEC, Paris, France.
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Obstacles to Recovery in Viet Nam and Kampuchea - U.S. Embargo of Humanitarian Aid.
(Impact Audit No. 3)
Charny, Joel; Spragens, John Jr.
Oxfam America, Boston, Mass. USA.
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Inspection Report on the Transport Situation of the Khmer Republic, 15-22 July 1971.
Asian Highway Transport Technical Bureau, United Nations Economic Commission for Asia and the Far East, Bangkok, Thailand.
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143p (1974). Eng.

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Health Statistics for Thai-Kampuchean Border Camps - Annual Report 1988 (Summary).

United Nations Border Relief Operation, Bangkok & Aranyaprathet, Thailand.

v+18p (1989). Eng.

Provides details of current health status in the Border Camps, including detailed demographic information (including age distributions, immunization records, etc.).

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Lower Mekong Water Resources Inventory - A Component of the Lower Mekong Basin Information System (Summary of Project Possibilities).

Interim Mekong Committee, Bangkok, Thailand.

WATCFO, Gaanderen, Netherlands.

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An assessment in 1984 of water resources development project possibilities in the Lower Mekong Basin. Included are medium and large size hydro-power, irrigation and floor control projects.

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Trip Report: Viet Nam, Laos, Kampuchea, Thailand (December 17, 1987-February 22, 1988).

(1988). Eng.

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United Nations, New York NY USA.

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Southeast Asia Resource Center.

Eng.

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The Indochina Project, Washington DC USA.

(1988). Eng.

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Pedler, John
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Toohey, D.E.
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UNICEF, Bangkok, Thailand.
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Food and Agriculture Organization of the United Nations, Rome, Italy.
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Overkamp, Jack
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Chuon Nath Association, Phnom Penh, Khmer Republic.
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University College, London School of Environmental Studies, Development Planning Unit.
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Reynell, Josephine
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Martin, Marie Alexandrine
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pp. 77-110 (1983). Eng., Fr.
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United Nations, New York NY USA.
108p (1968). Eng.
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East Asia and Pacific Department, International Bank for Reconstruction and Development, International Development Association, Washington DC USA.
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Pijpers, Bert
Trocaire, Dublin, Ireland.
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ACRONYMS USED IN THE TEXT

A. United Nations and other inter-governmental organizations

ADB - Asian Development Bank
CCOP - Coordinating Committee for Offshore Prospecting (East Asia)
ECAFE - UN Economic Commission for Asia and the Far East (until 1974)
ESCAP - UN Economic and Social Commission for Asia and the Pacific (from 1974)
EEC - European Economic Community
EFEO - *Ecole Francaise d'Extreme Orient*
FAO - Food and Agriculture Organization
IBRD/IDA/IFC - International Bank for Reconstruction and Development, International Development Association, International Finance Corporation (The World Bank Group)
ILO - International Labour Organization
IMF - International Monetary Fund
IRRI - International Rice Research Institute
OSRO - UN Office for Special Relief Operations
UNBRO - UN Border Relief Operation
UNDP - UN Development Programme
UNHCR - UN High Commissioner for Refugees
UNICEF - UN Children's Fund
UNIDO - UN Industrial Development Organization
USAID - US Agency for International Development
WFP - World Food Program
WHO - World Health organization

B. Countries and governmental agencies

ADAB - Australian Development Assistance Bureau
FRG - Federal Republic of Germany
GDR - German Democratic Republic
PRC - People's Republic of China
SIDA - Swedish International Development Agency
SRV - Socialist Republic of Viet Nam
UK - United Kingdom (Britain)
US - United States (of America)
USSR - Union of Soviet Socialist Republics

C. Non-governmental organizations (NGOs)

ACR - Australian Catholic Relief
AFSC - American Friends Service Committee
ARCS - Australian Red Cross Society
CIDSE - *Cooperation International pour le Developpement et la Solidarite*
COERR - Catholic Office for Emergency Relief and Refugees
CRF - *Croix Rouge Francais*
CWS - Church World Service
EdC - *Enfants du Cambodge*
EE - *Enfance Espoire*
GRET - *Group de Recherche et d'Echanges Technologique*
ICRC - International Committee of the Red Cross
IRRI - International Rice Research Institute
JANGOO - Joint Australian NGO Office
JVC - Japan International Volunteer Centre
LWS - Lutheran World Service
MSAVLK - Medical and Scientific Aid for Viet Nam, Laos and Kampuchea
MCC - Mennonite Central Committee
NOVIB - *Nederlandse Organisatie Voor International Ontwikkelingssamenwerking*
NRCS - National Red Cross Society of Switzerland
OHI - Operation Handicap International
OXFAM - Oxford Committee for Famine Relief
PADEK - Partnership for Development in Kampuchea
QSA - Quaker Service Australia
SRK - *Svenska Roda Korset* (Swedish Red Cross)
WCC - World Council of Churches
WVI - World Vision International

D. Cambodian government structures, 1960s

BAPAY - *Banque Agricole Paysanne*
BCC - *Banque Commerciale Cambodgienne*
BKC - *Banque Khmer du Commerce*
BNC - *Banque Nationale du Cambodge*
BPP - *Banque de Phnom Penh*
BS - *Banque Souvannaphum*
CAMECONG - *Compagnie des Caoutchoucs du Mekong*
CNE - *Caisse Nationale d'Equipment*
OROC - Office Royale de Cooperatives
SCKT - Societe Caoutchouc du Kompong Thom
SNGB - *Societe Nationale des Grands Barrages*
SPK - Societe des Plantations du Kratie

E. Khmer factions and governments of the 1970s and 1980s, and current institutions

BCEC - *Banque du Commerce Exterieur Cambodge*
CARRDI - Cambodian Rice Research and Development Institute
CFK - *Chemin de Fer du Kampuchea*
CGDK - Coalition Government of Democratic Kampuchea
CNHE - *Centre National d'Hygiene et Epidemeologie*
DK - Democratic Kampuchea
EDK - *Electricite de Kampuchea*
FUNCINPEC - National United Front for an Independent, Neutral and Co-operative Cambodia
GRUNK - Royal Government of National Union Of Kampuchea
INAT - *Institut National Anti Tuberculeux*
IRCC - *Institut de Recherche et d'Enseignment Forestier*
IRP - *Institut de Recherche Piscioole*
KAMSAB - Kampuchean Shipping Corporation
KPNLF - Khmer People's National Liberation Front
KPRC - Kampuchean People's Revolutionary Council
KR - Khmer Republic
KWA - Kampuchean Women's Association
MOULINAKA - *Mouvement pour le Liberation National du Kampuchea*
PDFGNUK - Patriotic and Democratic Front of Greater National Union of Kampuchea
PDK - *Partie Democratique Kampuchea*
PMI - *Protection Maternelle et Infantile*
PRK - People's Republic of Kampuchea
PRPK - People's Revolutionary Party of Kampuchea

F. Non-Khmer enterprises

Asiasat - Asia Satellite Company
BGI - *Brasserie et Glasserie de l'Indochine*
CGCT - (French telephone switchboard maker)
IRHO - (French agricultural institute)
JICA - Japan International Communications Agency (formerly OTCA)
OTCI - (Australian) Overseas Telephone Communications International
RICOFFI - (French firm)

G. Technical terms, projects, and units of measurement

4wd - four-wheel drive
dsa - daily subsistence allowance
dwt - deadweight tons
EPI - expanded programme of immunisation
ERU - elementary route unit(s)
FORCE - forest resources GDP - gross domestic product
GWh(/yr) - gigowatt-hour(s) of electricity (per year)
ha - hectare(s)
IR - international (hybrid) rice
IWT - inland water transportation
Kg ... - Kompong ...
kg - kilogramme(s)
km^2 - square kilometers
kV - kilovolt
kW - kilowatt
m^3(/s) - cubic meters (per second)
min. - minute(s)
MW - megawatt(s) of electricity
msl - mean sea level
MVA - manufacturing value added
NPK - nitrogen/phosphatic/potassium fertiliser
pha - (chemical balance in water)
RINE - rehydration, immunization, nutrition and education (integrated project)
RN - *route nationale*
t - tonne(s)

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